

AVIATION WEEK

OCT. 13, 1947

INCORPORATING AVIATION AND AVIATION NEWS

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THE AVIATION WEEK

PATTERN FOR POLICY—While President Truman's big DC-6 airplane, Independence, was being built, his Air Policy Commission from a rapid cost-to-cost survey of leading aircraft plants and research institutions, subsidiaries are that the Commission's findings thus far already have been shaped into a definite pattern. It is a pattern so well-defined, in fact, that even at the present stage—having evolved for changes—it may form the main outline for the Commission's report.

AIRPOWER FIRST—To be anticipated are strong recommendations for a healthy Air Force as being, for an aircraft industry capable of supplying replacements to keep the force up-to-date, for an industry capable of expanding rapidly to a much larger production capacity if war emergency requires.

It is not believed possible that this nation, or any other nation, was afforded to support a large enough Air Force as being to win a quick decision in World War III.

Only practical alternative appears to be a strong force and a strong aircraft industry which can expand in an emergency.

Commission is seeking its own favors for the volume of military production needed. An coordinating commission's 1945 recommendations of 37,000,000 lbs. or 3,375 planes annually is deemed inadequate in view of changed conditions. ACC figures were intended to be revised according to later developments, and Stanford University is now working on this project.

COMPETITION FOR QUALITY—Commission appears convinced that competition between aircraft manufacturers is the only method of assuring superior quality in U.S. Aircraft design.

Reference is that it will recommend sufficient military aircraft appropriations to sustain two or more strong "design teams" in each of the several specialized fields, such as heavy bombers, fighters, jetliners.

Virtually absolute power held by the second forces government agencies over the financial success or failure of individual aircraft companies is seen as not conducive to a healthy industry.

DISPOSING OF DISPENSAL—Evidence on the value and practicability of disposing the aircraft industry appears to have shown the Commission that further disposal would be of very little benefit.

Only effective disposal would require a larger plant, housing out main population centers, suppliers and heavy industry.

Such general disposal is now deemed impracticable. It is unlikely that recommendations will be made for the disposal of the aircraft industry.

On the other hand, positive recommendations should

be forthcoming on industrial participation planning. These should lead to tangible means to create an actual working setup for such contractors of industrial participation in stockpiles, reservation of machine tools and plants readily available in time of need.

Commission appears impatient with lack of actual progress so far toward anything more than "a plan for a plan" of industrial mobilization.

TRANSPORT SECOND FIDDLE—Commission is believed to consider military aviation problems as of prime importance, transcending any transport problem.

Outlook is that the Commission regards the actual principle of the 1938 Civil Aeronautics Act as basically good—if CAB can be speeded into quicker action, eliminating the need for retroactive pay. Existing budget and staff makes it impossible to get fast CAB action on economic questions involving road pay and rates.

Recommendations for additional CAB appointments would not be unexpected.

On the second of the major transport issues, the chosen instrument is aviation operations, it is likely that the Commission will make up its own mind.

It will take into account ACC's recommendation—which was therein down—and the testimony previously given at Congressional hearings.

It may well be that the result will be the same. The evidence placed before Congress was not sufficient to war approval for the proposal.

CARGO DIFFERENT—Commission recognizes a vast potential in air cargo, and considers it a different kind of air traffic requiring a different type of regulation. General recommendations as to future policy, rather than specific suggestions may be anticipated.

To what extent CAB's action on air cargo rates may also Commission cargo opinion cannot be estimated. Objection of the trucking situation existing for months in the air cargo field led the Board that time pulled the rug from under the independent freight carrier.

The investigation ordered into air cargo rates is little more than a step, in the view of the independent.

As the President's Air Policy Commission recognizes, the Board moves very slowly. Glaciers, independent air freighters predict that most of them will be forced out of business before the Board—if it sticks to past performance—could come up with an answer.

One interpretation of the Board's action is that it would extend the lowered rate applications as presenting a narrow field of selection, whether to aid the established airlines (which admittedly are in financial difficulties), or to choose further injury to them—the old choice between winners and those established in business. If that, indeed, were the only choice the outcome was logical.

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TASK KEY AIR FORCE POSTS—The following generals were shifted to key jobs in the latest reorganization of the independent Air Force's high command: (left to right) General Hoyt S. Vandenberg, brood as command of the Air Force as well as chief of staff; Lt. Gen. James Norstad, new deputy chief of staff for operations; Lt. Gen. Nathan Twining, Alaska theater commander in charge of all air, army and navy units in the Alaskan area; Lt. Gen. Curtis E. LeMay, chief of the USAF in Europe (USAF photos)

Air Force Streamlines Top Level Staff; Promotes 13 Generals

Hoyt Vandenberg becomes youngest full general in American history; Materiel Command to McNamary; Lt. Maj. Twining go to foreign posts.

By ROBERT HOTZ

U. S. Air Force fixed its newly reorganized staff last week with a reorganization of the high command accompanied by the largest batch of top level promotions since the war.

Principal effect of the top level reorganization will be to substitute a streamlined general staff with the chief of staff as its apex for the old military staff organization that in chart backed like a side with the commanding general as the focal point. New organization is designed to ease the traditional military backlog at the top and vests more authority and responsibility as well as command and staff duties.

■ **Business Pattern**—Starting at the top, the Air Force is a billion dollar business, Secretary of Air Stratton said that the methods of modern business were more applicable to many of its problems than the ancient military approach. He indicated that the current reorganization was accomplished with the assistance of many business leaders who served in the services during the war.

Among the major personnel changes

■ **Gen. Joseph B. McNamary**, formerly commander in chief military administration in the United Nations, was appointed commanding general of the Air Materiel Command at Wright Field, McNamary is the first full general to be named to command Wright Field. Stratton indicated his appointment was recognition of the increasing importance of business logistics and research to the Air Force. Stratton characterized McNamary as a "bright administrator."

■ **Lt. Gen. Hoyt S. Vandenberg** was promoted to full general and given the post of chief of staff, USAF, making him the youngest full general in American military history. He is 46. The promotion and his new job, which is the No. 2 spot in the new air force hierarchy give him a commanding lead over his subordinates as a successor to Gen. Spotts, now chief of staff. Vandenberg is the fourth full general in the air force, ranking behind Spotts, McNamary and George Kenney.

■ **Lt. Gen. Nathan Twining**, who shifted from chief of the Air Materiel

Command to theater commander of the Alaskan Theater of Operations. In his new post he will command all Army, Navy and Air Force units in the vital Alaskan area.

■ **Maj. Gen. James Norstad**, will return from the Army general staff to the Air Force something before Jan. 1 and become deputy chief of staff for operations as a lieutenant general. Norstad is regarded as a brilliant staff officer and one of the outstanding younger general officers in the Air Force.

■ **Maj. Gen. Curtis E. LeMay** was promoted to lieutenant general and shifted from staff director of research and development to command of the Air Force in the European Theater. He is succeeded in the command post by Maj. Gen. Lawrence Craig.

Air Materiel Command, which acquires new status under command of a full general at McNamary's office, who also strengthened by the appointment of Maj. Gen. Benjamin Chaffin, deputy commander, to lieutenant general, division of Brig. Gen. Franklin Condit, director of research and development at Wright Field to major general and former Col. Harry Shephard, director of procurement and industrial planning, in Biggs General.

President of Maj. Gen. Edward Hawkins, the air commander in lieutenant general also strengthened the emphasis on business management on the new air force staff work units are generally moved almost exclusively for purely tactical posts. Stratton described Hawkins as holding the Air

Don's past assignments.

Shift of Twining and Le May to four-engine ports was based on their wartime experience in combat. The new four-engine aircraft will be based on the substantial structure. The Alaskan Theater is the only one considered by an Air Force officer. Certain of the new Northwest Theater units will also be commanded by an Air Force officer, as expected to be transferred shortly. It will include the Northwestern United States, Greenland, Canada and Labrador and is designed to become one of the two main bastions of support on the Arctic frontier.

Control Center, Pilot Blamed in PCA Crash

A combination of control center and pilot error was credited by Senate investigator Carl Dethlefs with causing the crash of a Pan American Central Air Lines DC-4 last June 11 on west coast of the Blue Ridge Mountains in West Virginia. All of the 51 persons aboard were killed.

Dethlefs is the technical advisor to Senate Owen Brewster's (R, Me.) aviation subcommittee of the Senate Interstate and Foreign Commerce Committee. His report is based on CAB hearings and investigations.

The Washington control center, Dethlefs admitted, acted in permitting pilot to fly at 10,000 ft. instead of the 2,500 ft. or less as necessary where the CAB requires flight to be at a minimum of 1,000 ft. above the terrain. At the scene of the accident this would require flight at 2,600 ft. PCA requires 1,000 ft. minimum over the main highway. Dethlefs and the pilot acted in failing to observe both company and CAB regulations at that time.

CNA came in for more criticism by the Senate investigator who pointed out that CNA weather reports gave a 600 ft.

Preparing For Hughes

Members of the Senate War Investigating subcommittee are pressing themselves an clouded account with facts and figures about the \$40,000,000 Hughes flying boat and the \$18,000,000 Hughes NF-11 fighter reconnaissance plane in anticipation of a second hearing session with predecessor Howard Hughes scheduled Nov. 17. The session may be moved up. Members have indicated for instance that the second hearing will not be the same as the first hearing this summer admittedly was, and are hopeful that the inquiry will "settle down to the real thing." Subcommittees have already been issued both by Hughes and publicity man Johnny Meyer.

Subcommittee's grounds for issuance of the inquiry, it stated by sub-committee counsel Francis Flanagan that "Hughes has obtained about \$40,000,000 in government funds and has given the government nothing concrete and verifiable in return. That justice be required."

Flanagan and the sub-committee does not plan full scale investigations of the 61 plane projects which Hughes has listed as being large government expenditures but focusing on overseas projects. "Hughes could have listed a thousand projects for us to investigate before proceeding with his projects," Flanagan said.

asking for Washington what it was actually 1,000 ft. and that the CAA-operated traffic control authority on clearing planes was too vague to be practical. Dethlefs also recommended that

CAB should clearly cutting rules and regulations to allow a standard approach procedure common to Air Force, Navy, Civil and foreign and coastwise airlines. He also recommended that the CAA administration take steps to cover that entire maintenance aspect by make independent of all mechanics and engineers in charge of maintenance so that they will be able to examine their authority to ground a plane without suspending their jobs.

Alpha Crash Studies Continued By CAB

CAB sources say the Board will continue its investigation primarily for some weeks into the crash of American Airlines experimental plane "Alpha" last August. Hearing was resumed recently after a Quaker County (N. Y.) grand jury had charged that the pilot was intoxicated at the time of the accident.

Sworn affidavits and direct testimony from more than 40 witnesses at the reopened hearing accounted for virtually all the pilot's day preceding the mishap as evidence he could not possibly have been under the influence of alcohol. Miss Wilma A. Davidson, widow of the deceased pilot testified that when Davidson left the house on the morning of the crash he had \$5 on his person. When his body was removed from the plane his pockets contained \$4.75.

Republic Executive Dies

Harvey W. Pheasant, vice president of Republic Aviation Corp. since 1941, died last week in Manassas, L. I. Mr. Pheasant joined Republic in 1939. A retired lieutenant colonel in the Army and a pilot since 1916, he became the public's official representative in the European theater when he went to England late in 1942 with the first Thunderbolts. For the last year he consulted the company in Washington.



ARGENTINE JET FIGHTER

First photo of Argentina's state-of-the-art jet fighter, the "Pulsar," built at the Aero Techn Institute, a branch of the Argentine Air Force at Cordoba. The jet fighter is powered by a Rolls-Royce Derwent V engine of 7,000 hp. The strafe tank, which gives it a top speed of slightly more than 4,000 mph. It has a length of over 40 feet and weighs about 10,000 lbs. The A-11 factory is now at work on an Argentine version of the British Mustang powered by Pratt & Whitney R-2800 engine, a rather copy of the North American A-16 and the "Bomber" equivalent in a twin seat. Both 2- and 4-engine transports are being designed (McGraw-Hill World News photo)

Sanders Aviation, Inc., Acquires Exclusive Ecoupe Sales Rights

Deal also involves purchase of all ERCO parts, planes and material at Riverside, Md., plant; Ryan leaves firm for Wall Street job.

By ALEXANDER McSURELY

Exclusive international distribution rights for the two-place two-control Ecoupe manufactured by Engineering & Research Corp., Roseland, Md., have been acquired by Sanders Aviation, Inc., operating at Roseland.

Exact amount of the transaction has not been disclosed but it was understood to be several hundred thousand dollars. Besides distribution rights, contract also includes purchase of all parts and uncompleted Ecoupe and new aircraft stock at the plant, according to Robert Sanders, president of the new distributors and service organization.

Mr. Sanders, in case as the manufacturer adds a new completed Ecoupe remaining at the home field a new manufacturing program will be adopted by ERCO.

It provides for ERCO to manufacture airplanes on order from the Sanders organization, which will distribute them through national and foreign sales organizations of distributors and dealers. No immediate change was planned in the present Ecoupe distributor and dealer organization. Several members of the ERCO sales department along with all members of the ERCO service department will be transferred over to Sanders.

George Ryan, ERCO sales director, has resigned effective Nov. 1, to accept

a position as an associate of Farrell & Co., 32 Wall Street, New York, where he will specialize in aviation securities. Mr. Ryan, ERCO-licensed service, to Ecoupe customers, dealer and distributor will be a primary goal of the new step, Sanders told AVIATION WEEK. Plans stated will be transferred from the ERCO plant to warehouse at ERCO field from which they will be made available promptly on call of distribution, and to dealer, too, if necessary. Sanders hopes his distributors will stock sufficient parts to meet their dealers' needs except in emergency but will endeavor to provide special service in such cases.

The new sales and service organization will establish offices at ERCO's home adjoining the ERCO factory and will have a staff of approximately 35. In addition to the international distributorship, Sanders Aviation will continue to hold local distributorship for Ecoupe in the District of Columbia and State of Virginia, which it acquired from Service Corp., headed by W. L. Kirk Nelson, some time ago. It will also continue to hold the Bendix Radio distributorship for the District and Virginia.

Former NACA Man-Jobert Sanders, head of the new organization, was associated with the National Advisory Committee for Aeronautics Langley

(Va.) laboratory from 1935 to 1937. There he worked with Paul W. Lewis, now vice president-engineering, ERCO, on the representative World two-control airplane W-1, forerunner of the Ecoupe. He was employed by Prange in South America, from 1935 to 1936, and at ERCO from 1936 to 1941. After World War he joined the Navy, in which he attained the rank of Commodore, he returned to ERCO in 1946, leading the service department. He left that position to organize Sanders Aviation. He was one of the two last pilots on the first Ecoupe prototype. His brother, Richard H. Sanders, former Pan American flight engineer, is associated with him in the company. They are nephew of Col. Henry H. Harts, chairman of the ERCO board of directors.

Mr. Sanders said, there is an understanding not yet formalized concerning the Sanders Aviation will handle distribution for other airplanes which will be produced later by ERCO. The four-place 165 hp. Ecoupe form, a two-control airplane expected to make its first test flight this week, may be made available by next Spring, probably will be the first of three. The five-place Ecoupe, a two-engine two-control design, is a second experimental airplane in early stage of development which the company may eventually put into production.

AOA to Charter Flights If Pilot Strike Continues

American Overseas Airlines, still-to-be formed over a week, continues to hold personnel at LaGuardia Field. No evidence has been seen of the ending of the strike which now called by the AOA. The AOA is expected to be the Atlantic continent AOA in order to charter its planes to other overseas operators as an attempt to keep the ship busy. In the face of last business and limited expense the AOA is expected to have to suspend the majority of its employees until the strike has reached a settlement.

What may be the underlying cause of the strike is the company's system inaugurated under the name "Jobby" duty by two scheduled flights, curtailing their time of duty to such an extent that safety of regular flights is affected. Flights ability to return to work until this practice is corrected.

Company will assess officials have been meeting with President A. O'Neill, Jr. of the National Maritime Board in Washington in an effort to reach an agreement.

The strike refused to consider proposals by the pilots until the flight was operating again.



NEW MATERIAL LINEUP—Subgroup of the U. S. Air Force high command pick the following generals in top material spots. From left to right: Gen. Harold G. Troop, top full general to command the Air Materiel Command with headquarters at Wright Field, Leas, Gen. Howard B. Craig, deputy chief of the USAF staff for material at Washington, Lt. Gen. Edwin Rawlings, who controls the Air Force peace talks at Air Comptroller and Maj. Gen. Franklin G. Caswell, director of research and development for the Air Materiel Command at Wright Field. (Dial photos)



New Aircraft

Flying Wing Jet Bomber Completed

Northrop YB-49 needed for test flights at Hawthorne, Calif. most powerful plane.

Completion of the Northrop YB-49 and its approaching test flight should provide a convincing answer to questions of American technical leadership in aerodynamics. By integrating the flying wing with jet propulsion, Northrop and Air Force engineers are confident that an entirely new chapter in aircraft design and tactical planning was now being written.

Although essentially a modification of the XB-35, the YB-49 includes new features which greatly enhance the performance of the flying wing bomber. Powered by eight General Electric J35 turbojet engines producing 32,000 lb. of thrust each, the transonic power planes the top speed of the jet bomber over the 500 mph. mark. Although the fuel consumption of these engines is far less than that of the B-35 turbojets, range of the jet bomber has only a little more than half through careful attention to additional fuel capacity is available here.

Power Changed—The change in power plant from Pratt & Whitney K-4060 propeller engines to turbojet types required extensive modification of the wing center section to accommodate the release of the latter to the smallest possible dimensions. The external engine is such that it actually hangs in the outer wing panel. This latter change required a shortening of the inboard leading edge panel, which was compensated for by a large increase in inboard flap area.

The extensive remote control armament of the B-35 has been eliminated in the YB-49 and only the control tail turret, mounting four 75-cal. machine guns, has been retained. The extreme area in the wing internally occupied by upper and lower gun barrels has been converted to fuel storage. Additional fuel storage was provided by the space formerly occupied by the main part of the Wright Major engines. Reduced oil fuel-storage amount, however, than two engines does not seem to be required for the purpose.

An Spantion—Four "air scooters" are mounted on the YB-49 leading edge to provide the laminar, stability and an landing qualities. The laminar is provided by the four pop-up-like scooters and provides very important status in the basic configuration of the XB-35 wing shape and the removal of this area would have required a fundamental aerodynamic change in the YB-49 with accompanying increased costs. The separated local area is provided by the four fan. Extension of the dorsal fin to a point near the leading edge of the wing, prevents the formation of vortices rising from the area between them. The high velocity air sheet about the turbojet engine booms creates a low pressure area and which prevents flow might be created. The air sheet prevents the spilling of the booms and laminar air sheet region and provides a straight line chord from the leading edge.

Dimensions of the YB-49 remain the same as those of the XB-35 a 372 ft. span and a 454 ft. length. Empty weight is 58,100 lb. and gross weight is 209,000 lb. A new innovation in the YB-49 is the use of an electrically actuated thrust system to control the jet reaction evenly and smoothly.

Tails at Muroc—Following completion last week, the YB-49 was rolled from the hangar and placed outdoors for final preparations. The test planes had now been completed but the engine test was held until a few hours required for their installation. The second YB-49 is being completed and will start the prototype at Muroc Army Air Base this fall.

Test flights of the new YB-49 is scheduled for the last week in October with the rollout from the Northrop Field at Hawthorne, Calif.

At Muroc the YB-49 will join the two Northrop XB-35 flying wing bombers on which it has been already declared by General George Kenney. Since the first flight of the XB-35 in the summer of 1946 there have been 22 jet gun-bus failures in the air on the ground. In a recent test flight, two jet gun-bus failed within 15 minutes after the takeoff.

New Propeller—Following the latter experience, Northrop and Air Force engineers prepared the more compact and efficient design of the two XB-35 propellers as well as the 11 production YB-35 bombers for augmentation purposes. Gear box failures and the mechanical completion of the jet type posed questions concerning the adaptability of converting the existing B-35 to jet power. Northrop engineers point out that the existing planes are too far advanced to permit this without an extensive delay in delivery. Delivery of the new Hamilton Standard gear boxes and propellers to Muroc will enable rapid conversion of the two prototypes and an early acceptance of delivery test flights.

The entire Northrop flying wing bomber concept now includes the XB-75, XB-76, XB-77 and two YB-49 types is scheduled for completion sometime late next year.

Decision Expected On DC-9 Project

Final decision on whether Douglas Aircraft Co. will build or abandon its proposed 28-passenger two-engine DC-9 transport, is expected this week at Santa Monica, Calif.

At ANTIWAR Week press time, potential airline customers for the plane were believed to have reached agreement on configuration and specifications, and some representatives were optimistic about the plane's future. Indications are that Douglas designers in defiance to airline demands for short runway operations, will add 100 cu ft to the suggested DC-9 wing surface area, and increase the length of a wing having an average high (low transport) aspect ratio of 12.

Douglas originally contemplated wing area of 311 ft. with a mean aerodynamic chord of 8.41 ft. giving a total surface of 349 sq ft. Addition of 100 cu ft of wing surface would increase a 0.4 ft. chord and aspect ratio of 16.74, still higher than the 9.5 aspect ratio of the DC-8.

The suggested increase in wing surface would reduce wing loading, at 30,000 lb. gross, from 15.7 lb./sq. ft., contemplated under original Douglas specifications, to 11 ft/lb.

Appropriate increase in gross weight and wing loading of the transport's final specifications will cause if permission is required by airline.

Douglas' original tentative specifications for a 1991 lb. gross for a two-engine transport with main span 107 ft., length 79 ft. 5 in., two 1675 hp. Wright engine R-1420 engines 257 mph cruise at 10,000 ft. on 50 percent power 15,000 ft. single-engine cruise, and absolute wing loading 3490 gm.

Congress Air Group Divides for Studies

The ten member House-Senate Air Policy Committee last week divided itself into four subcommittees to study the many phases of the all-embracing aviation program. The group expects to have the plan blueprint by March for implementation during the next session of Congress.

The Congressional group will coordinate itself with a broad-based partner in the President's Air Policy Commission until the end of the year. Its four subcommittees—on satellite/interceptor, transportation, combat mission, and government operations—will work behind closed doors, maintaining and consulting with industry and government advisors. With the benefit of the subcommittees' findings and the recommendations of the President's Commission—scheduled to convene in 1953—the coordinating committee will report to the two bodies in 1952, most probably having public hearings.

The committee and its 15-member advisory council completed ground work conferences on overall foreign policy and national defense requirements at sessions with Secretary of Air Staff Brigadier, Assistant Secretary of Navy for Air John Nicholas Brown, and Secretary of Commerce Averell Harriman. Previous sessions were held with State Department advisor George Kenney and Secretary of Defense James V. Forrestal.

Four subcommittees are assigned specific assignments to draw up the annual defense aviation program which will largely determine the future of aviation as well as military aviation, is headed by Col. H. H. (Bud) Campbell in addition to its general chair, Representative James C. Eastman. The subcommittee will deliver into military policy in research, support, safety, installation, and training.

Helicopter Damage Suit

Bel Aircraft Corp., Buffalo, N. Y., is named defendant in a \$100,000 damage suit filed in U. S. District Court, Buffalo, N. Y., by Mrs. Walter A. Stock, St. Louis, executor for the estate of her husband, a CAA inspector who was killed in an accident in a Bel helicopter. Mrs. Stock is Seattle Division alleges "defective and inadequate assembly of component parts," and failure of defendant "to make necessary tests and repairs of the helicopter to discover its defects."



Two members of the Joint Congressional Aviation Policy Board are shown with two members of the advisory council. Left to right: Roy G. Hensley, R., Calif. vice chairman, and John J. Tamm, chairman of the board, both in the Secretary of the Navy and member of the advisory council. (IN Photo)

LETTERS

Domestic Flight Engineers?

To the Editor:

Having an overview on one of the most important safety questions in aviation today, namely the requirement that flight engineers be certified on all four engine equipment that has been proposed, I am glad to see that an educational study into the necessity of the above exists in the last year by government agencies of our aviation.

The Air Line Pilots Association has recommended that a third cockpit member be certified on four engine aircraft, whose primary responsibility is the proper mechanical function of aircraft and engine which would relieve the pilot for the sole and complete job of piloting the aircraft.

Modern four-engine airplanes have required such a multiplicity of instruments, switches, and complete of special duty, that the pilot's ability to focus his attention on all of the critical instruments and equipment is often overstressed. This is especially true during adverse weather conditions or malfunctioning of equipment.

The main defects of several combination engines, the complications of accessory systems, and the increasing number of mechanical features such as cabin superchargers, electrical and hydraulic control systems, heating and cooling units, make it impossible for a pilot to manage all these intricately for satisfactory operation and at the same time make sure engine work, by the traffic

patterns, and have intelligent receipt of ground instructions while flying the airplane by use of the flight instruments. Transition is follows in logical order that a competent flight engineer be present release sole interest in the engine and related equipment.

As long as on May 18, 1947, Mr. W. S. Thawley, then Director of the Safety Bureau of the CAB announced that an early check on engine be carried but that of the various controls presented to his job be granted at a panel or station on all four engine airplanes.

American airline operators have carried flight engineers for a number of years. Domestic operations, with a few exceptions, have been reluctant to agree to the need of a third man, claiming that the cost would be prohibitive for four-engine operations. When the loss of life, cost of equipment, and the loss of revenue that accompanies a bad crash is balanced against the safety of the engineer it becomes clear that the cost is not so high.

Thanking the CAB, who are interested in the riding safety of the aviation public are going to determine whether to make this safety re-evaluation a permanent law. Whatever the outcome it is definitely a step in the right direction by clear thinking people who realize that the only way to keep American aviation foremost in the world is to give the passenger the best and safest ride in the world.

George E. Bruckner, President
Aero-Flight Engineers Assn.
Local 26700, A.F.P.
P. O. Box 41, La Guardia Airport Sta.

Air Show Quiz

Questionnaires have been sent out to 400 key aviation supply and manufacturing people, for their opinion on new dates and conditions for holding the National Airport Show and Institute, following postponement from the original plan to hold the show in Cleveland. Public Mail Nov. 4 through 7, National Aeronautic Association and Cleveland Air Foundation, co-sponsors, based decisions to postpone the show on the "lag" in the implementation of the federal airport program and the growing scarcity of construction materials.

AVIATION CALENDAR

Oct. 24-25—AT&T World-Industry Institute meeting in private club and computer manufacturers, Wichita Falls, Texas, Okla.
Oct. 26—International Air Transport Association (IATA) annual general meeting, Geneva.
Oct. 26-28—Western Union of Trade, one day and evening of special National Retail Convention and Exposition, Chicago.
Oct. 30—International Air Transport Association (IATA) annual meeting, Honolulu.
Oct. 30—Air Industries and Transport Association of Canada (AITAC) meeting, West Berlin, West Germany.
Oct. 30-31—Air Day in Your' aviation show, Westport, Texas.
Oct. 31—Aeronautics symposium regarding Mutual International Airport to assist European flight, Rome, Italy.
Nov. 1-10—30th World Association of Air Traffic Controllers, Fort Worth, Texas.
Nov. 2—ICAO special conference in state-of-the-art facilities, Denver.
Nov. 2-4—Michael B. Rosenzweig Conference, Regency West Hotel, Chicago.
Nov. 2-3—Aero and Aerospace symposium, Office of Aeronautics Engineers, West Berlin, West Germany.
Nov. 3-10—1968 Aviation System Analysis (ASA) symposium, Washington, D.C.
Nov. 3-10—1968 Airport Planning and Airline Club symposium, St. Louis.
Nov. 4-5—AT&T Transport Meeting, Office of Aeronautics Engineers, West Coast, California, San Diego, Calif.
Nov. 4-5—1968 annual meeting, Aviation Manufacturers and Manufacturers Association, West Coast, California, San Diego, Calif.
Nov. 4-5—1968 Institute of Aeronautics and Astronautics meeting, West Coast, California, San Diego, Calif.
Nov. 4-5—Department of Experimental Stress Analysis, special meeting, West Coast, California, San Diego, Calif.
Nov. 4-5—International aviation exhibition, Paris.
Nov. 4-5—AIAA meeting, St. Louis, Missouri.
Nov. 4-5—ICAO workshop, Montreal, Quebec, Canada.
Nov. 4-5—ASA one day scheduled operators of airlines, Fort Worth, Texas.
Nov. 4-5—1968 international symposium and show, West Berlin, West Germany.
Nov. 6-10—ICAO general assembly, Montreal, Quebec, Canada.
Nov. 6-10—ICAO rules of the air and air traffic control, Montreal, Quebec, Canada.
Nov. 6-10—1968 International Aviation Symposium and Exhibition, West Berlin, West Germany.
Nov. 6-10—ICAO conventions, Montreal, Quebec, Canada.

INDUSTRY OBSERVER

► North American test pilot George Welch had a few bad moments during the mental test flight of the USAF XP-56, swept back wing, jet-powered fighter. Approaching the end of a 90 minute flight at Maxon, Welch was unable to lower the nose wheel on a landing. The air 4' down nose high. Inquest of the main gear wheel jelled the nose wheel in time to complete a normal landing.

► Major modifications of later B-56 bombers which will utilize the plane's jet engines and propeller tractor instead of pushers is being discussed by Air Force and Convair. A new and more powerful development of the Pratt & Whitney Wasp Major 4360 engine figures in the proposed change, which is expected to increase speed of the big bombers very materially.

► General industry recognition by its major in half-dozen companies is expected in the building of a new high-horsepower dissimilarity trainer for the Air Force. The trainer will combine the purposes of the primary and back trainers, starting the novice pilot out in a more advanced phase at the beginning of flight training.

► New Northrop-Air Force contract for automatic cross flap control system calls for 10 hours of P-61C Black Widow ground and flight tests of two Lent, Inc., and a Lusted Co. system. The use of manually-controlled system to join and close cross flaps automatically, now used on German or Focke-Wulf fighters.

► Fast quantity production of Westinghouse HO2B axial flow turbojet engines is now under way at Pratt & Whitney division, United Aircraft Corp., Conn., following award of sub-contract last March. Production has accelerated slowly due to design changes and new production techniques required. Total of 130 production engines is scheduled for completion next spring, sufficient to supply McDonnell F-111 jet fighter squadron with service and spare engines and units for Navy guided missile conversion. Westinghouse production is scheduled to reach planned peak by completion of P & W contract.

► Latest USAF attempt to draw the new version of already a little tighter involves restricting specifications of new aircraft to even foot and wingtip of the odd inches. Engineers interested in exact specifications should interpret Air Force press releases accordingly.

► British Overseas Airways has decided not to use Avro Tudor IV, on the North Atlantic as reported previously in AVIATION WEEK. There is still a possibility that BOAC may use them as backup routes by converting to a 24 passenger version, the Rex Debus, chairman of A. V. Roe Ltd. charges that BOAC deliberately multiplied modifications to delay getting the Tudor into service until they were so obsolete that the purchase of American transports would be justified. BOAC denies the charges. Full inquiry has been ordered by the Supply Ministry.

► Ranger Engine Division, Finchfield, is developing a small constant speed propeller under Air Force experimental contract. Finchfield piston plane division has received new contracts from the Navy for additional 14 piston aircraft development.

► Douglas Aircraft Co. estimates it would cost 15 times as much to design and produce the first DC-9, two-engine transport under design study, as it cost to produce the DC-8, original prototype of the Douglas transport series. Engineering and tooling costs for the first 100 DC-9s would be 14 times the similar costs for the first DC-8s.

► Douglas also reports that while the five-engine DC-6 was priced to break even with production of 200 airplanes, estimate in units of labor and material has risen the price from \$975,000 to around \$278,000 per airplane, and there is no indication that the book-ends point will be below 100 planes. With only three fourths of the 200 airplanes originally projected now sold, the list scheduled for delivery next spring, Douglas estimates the company's loss at that time on that model will be \$33,000,000.

► U. S. government purchases of helicopters, principally from Sikorsky, have totalled approximately 400. Ray Stoney estimates that a practical helicopter of 20,000 to 25,000 lb. gross weight can now be manufactured with present engineering knowledge and proper financial backing.

► Bell Aircraft Corp. now has 108 of its commercial helicopters in commercial operations in 33 states.



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Shrinkage Seen in Export Business

Marshall Plan a complicating factor in world-wide dollar shortage.

Exporters of aircraft and parts face a possible loss of business as a result of the dollar shortage in new contracting away countries, it is the conclusion of the McGraw Hill Department of Economics, which has just completed an economic study of U. S. export trends. So far this year foreign shipments by the aircraft industry have been running at a rate of about \$161,000,000 annually. This is almost 90% above the 1946 level. However, some of the industry's best customers are among those most hard hit by the current dollar squeeze.

This is the case, for example, with Britain's partners in the Empire whose customers are closely tied to the pound sterling. The number one customer for U. S. aircraft and parts this year has been India. South Africa and Australia also have made some good purchases.

These are all countries that have been particularly hard hit by Britain's failure to maintain convertibility. The fact that these countries hold large sterling balances in London will be an added incentive for them to reconvert some of these funds orders in dollars.

► **Marshall Plan Effects**—The same difficulties prevail to some extent in Western Europe. Only those the Marshall Plan adds a complicating factor. The Netherlands and Belgium, and to a lesser extent France and Denmark, have been in the U. S. market for aircraft and parts this year. As a matter of fact, if Britain's own modest purchases are

added, these Western European countries have received about one-fourth of U. S. exports.

Aircraft and parts are not on the list of priority needs set up under the Marshall program. The McGraw Hill study points out that this does not mean that some countries of Western Europe which lack an adequate aircraft industry will cease buying in the United States. A sizable portion of their buying still is expected to go for the high quality equipment only this country can turn out.

The Marshall program will mean, however, that American aircraft firms may face an added obstacle in selling to Western Europe over the next several years. That obstacle again is a shortage of dollar exchange. Pressure will be on European countries to buy in Britain and France whenever they can locate suitable equipment.

► **Highway Market**—The largest present market for aircraft and parts continues to be found in Canada and the countries in the South. Shipments to the Western Hemisphere as a whole are held again the rest of last year and account for about 55% of the total. Argentina has retained its previous position as the biggest buyer, followed closely by Canada and Brazil, Mexico, Colombia, Venezuela, and Peru have made new record purchases.

These countries all have been spending substantially more dollars than they currently are earning. Canada, for example, has been importing about twice as much from the U. S. than it has exported. Unbalanced foreign payments of this type have been possible in part because all these countries hoarded dollars they earned in shipping supplies to

the U. S. during the war. Now these hoards are running short and the squeeze is on to reduce imports.

Aircraft and parts are likely to be awarded a high performance on export lists of the countries in this hemisphere. Moreover, in some cases financing will be provided from sources within the U. S. Aircraft firms therefore are likely to experience less trouble from the dollar shortage in this hemisphere than in other parts of the world. Even so, scarcity of the dollar is likely to be something they will look up against.

Missiles 5 Years Away

Almost any competent aircraft manufacturer could today produce a subsonic guided missile with a range up to 4000 miles and a speed of around 600 mph. John S. Northrop, president of Northrop Aircraft, Inc., Hawthorne, Calif., told the Postoffice Air Policy Commission last week. Northrop pointed out, however, that the problem of accurate guidance over the greatly increased range was the most serious problem, along with ease of interception by the enemy country. Superior missiles are not as far advanced in development. Northrop said that the problem had been greatly reduced on the immediate prospect of push-button missiles, and that even the simplest and cheapest development program for missiles would require at least five years before it would be possible to make enough missiles for use as effective weapons in intercontinental war.



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TEST-PLANT SILENCERS

Eighty feet high and five feet in diameter, these silencers muffle the roar of jet engines tested at General Electric's River Plot in Lynn, Mass. Without them the exhaust of the engines as adjoining test chambers would be audible for miles. The silencers are being installed now for tests on new jet power plants. (World Wide photo)

► That's a large order for the galley space of even such a modern An-Liner as the new Boeing Strato-Liner. Weber was given the problem of engineering and manufacturing a galley designed to produce 2 full meals and a snack for 80 passengers without unpleasant Weber craftsmanship produced a galley most enthusiastically received.

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(In millions of dollars)

	1947	1946	1945
Total	\$83.4	\$115.3	\$68.2
Principal buyers:			
Argentina	5.8	4.2	6.2
Brazil	6.4	7.5	1.9
Colombia, Peru, & Venezuela	5.1	5.9	1.4
Mexico	2.5	4.6	1.2
Canada	6.6	15.6	3.5
Belgium & Luxembourg	6.0	3.1	.4
France	4.6	15.5	9
Netherlands	2.0	9.5	1.1
Sweden & Norway	3.2	6.5	1.0
Switzerland	2.2	1.1	.3
United Kingdom	3.2	6.1	3.9
Australia	3.4	5.9	1.2
Union of South Africa	3.0	3.9	5
India	10.3	6	.1
China	5.1	4.3	6.4

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Hughes XF-11 to Test Photo Plane Worth

Wright Field to take delivery on first plane designed specifically for purpose. Features high speed.

An Material Contract at Wright Field as the next few weeks will take delivery on the Hughes XF-11 and the Air Forces will have its first opportunity to examine the full combat potential of this photo-reconnaissance craft. The XF-11 is the first designed-for-the-purpose U.S. military photo plane, all previous craft having been converted

craft, bomber or fighter types with inherent limitations. The XF-11 is capable of a top speed of 410 mph., can operate at altitudes above 40,000 ft. and has a range of more than 5,000 mi., a superior performance for an airplane with a design gross weight of 47,500 lb. and a permissible overload of 15,000 lb.

This plane is actually an outgrowth of an earlier photographic airplane designed by Howard Hughes as a private venture for possible war use.

Background—Following a survey of existing design and plant facilities during Aug., 1943, Col. Elliot Roosevelt recommended the award of a contract for the Hughes project in September. The contract called for the construction of two experimental XF-11 prototypes, one in the first model and 18 production F-11's at a cost of \$48,557,000 plus 4% profit—\$50,497,000.

The airplane, the Hughes D-2, was designed for Diamond D construction, a fabrication method developed by Col. V. E. Clark (ret.), chief mechanical engineer of the Army during World War I. This process was licensed to Puettfield Engine and Airplane Corp. early in the war and Col. Clark continued his development work at Hughes Aircraft.

The process consists of molding resin-impregnated plywood with built-in mechanical joints (300° F. and 24,000 lb. per sq. in.) to heavy dies to the desired contour and subsequent curing. Although this idea is not new (having been used by John K. Northrup in the Lockheed Vega 1 of 1927), continuous development has discovered the strength and rigidity of this material to a degree comparable with metal on a weight basis.

First Model—The Hughes D-2 had a span of 65 ft., a length of 43 ft. and was powered by two Pratt & Whitney R-2800 Double Wasp engines of 2,000 hp. each. The prototype was completed in the autumn of 1943 and test flown extensively at a secret base at Harper



To provide flight test data on this high-speed version of XF-11, Howard Hughes mounted his and installed on engine Douglas 4-200 and obtained available structural ratings, control stick forces and resistor observations research data. Mechanical studies show how the subject A-200 resistance.



The nose of the Hughes XF-11 reveals full open top panel and upper canopy and its lower control. Two windows at each wingtip "tail" for pilot's control seat. Manufacturing of right-hand control-reversing gear was finished by Hughes for installation in nose. Large line tubed-rod rubber and clevises rubber shock brace brace control "tail".

Lake, a day late but in the Mojave Desert similar to Marine Army Air Base. On Nov. 11, 1944 during a heavy desert storm the larger containing the D-2 was struck by lightning and the airplane destroyed.

Following award of the contract, Air Materiel Command refused to permit Hughes to build the production model of the plane of Diamond process used and asked a complete redesign, chief change in which was the use of Pratt & Whitney R-4360 Whisp Major engines. The first airplane assembled R-4360-31 engines powered 10,525 to drive 8-blade Himmeler-bladed counter-rotating propellers. The second XF-11 as powered by R-4360-37 engines gained 10.15 to drive single-rotor Curtiss four-blade propellers 14 ft 8 in. in diameter. Each engine carried two exhaust-driven turbo-superchargers, one mounted on each side of the engine nacelle. Air intakes are mounted directly below the engine, the center portion of the intake providing air for oil cooling.

Construction Details—The wing is built up on two spars and divided into a center section and two outer panels, which are assembled. Pinned fabric ribs and ribbed structure, which also complete the structure. Skin covering is Aviald 24ST and the internal structure is 745RT, a heat-treated steel and cold worked stainless steel.

The 37,183 lb empty weight of the XF-11 was actually 1,000 lb, under its design empty weight, one of the few aircraft to be completed appreciably lighter than its design specifications. The crew nacelle is mounted on the center-section and houses the pilot and the counter-rotating engine side-by-side within a streamlined bubble canopy. The entire crew cabin is pressurized for high altitude flight. The nose contains a maneuver panel from which the control operator sits, while in a prone position. Entrance to the cabin is attained through a folding, retractable ladder extending downward from the nacelle belly when the landing gear door is open. Landing gear is tricycle with the nose gear folding directly inward and up into the nacelle, clam-shell doors folding to seal the opening when in flight. The main gear seats manual double shock and fold inward and up into the tail boom.

Control System—The empennage is supported on two monocoque booms with a single horizontal surface mounted between the outer booms. The rudder and elevator are twin tail controlled systems in which the pilot's controls are linked directly with the trim tabs, which, in turn, control the surfaces. Functionality of this system was determined by flight tests on a Douglas A-21 light bomber with a full scale XF-11 vertical stabilizer and rudder installed.

Control control is obtained by spoiler gear's located over the top hinge line. These spoiler areas are moved out of the wing on the side towards which the control wheel is moved, the panel "splitting" the flow over the wing, creating loss of lift and increase in drag on that wing and thereby pulling it back and down to correct the bank. Because these panels move up substantially normal to the wind, there is little or no spin resistance back to the control wheel. To provide this necessary control "feel" two small conventional ailerons are carried at the wing tips.

Purpose of the wing spoilers is to prevent the use of many full-span flaps. This system was developed by John K.

HUGHES XF-11	
Top Speed	3,600-400 mph
Span	101 ft. 3 in.
Length	65 ft. 5 in.
Height	23 ft. 3 in.
Empty Weight	37,103 lb.
Normal Gross Weight	47,500 lb.
Overload Gross Weight	55,300 lb.
Maximum Speed	410 mph @ 10,000 ft.
Service Ceiling	44,800 ft.
Absolute Ceiling	46,000 ft.
Range	5,000 mi.

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Northrop and first used on the F-62 B-52. Window night fighter, a plane the XP-11 resembles in general layout. Big people entered instead in the boom and two large panels entered between the booms. This large fin area permits the XP-11 to stall at only 50 mph, (considered marginal) in an airplane of its size.

► **High-Speed Report**—The stability and control of the XP-11 is considered excellent by Howard Hughes, the only pilot who has flown the large craft. Concerning its handling qualities, he says "It flies like a P-51 and has the best stall characteristics of any plane I've flown. You get all kinds of warning. With power off, flaps and gear down, it is impossible to stall it on the first attempt."

"After the wheel is pulled off the way back the nose will swing up as far, then drop slightly and pick up speed. In three seconds up again and on the second run you get a good, clean stall. Why it will not stall on the first occasion I don't know."

Hughes also points out that the XP-11 is the quietest airplane he ever flew and claims it has little vibration.

One of the unusual characteristics of the first XP-11 was the fact that it flew at zero trim on its test flight, one of the few aircraft to achieve this feat. In balance, according to Hughes, the concept XP-11 requires the use of some "nose down" trim due to the difference in balance introduced by the removal of the original heavy jiggler gun booms and installation of the lighter nose without a change in engine thrust.

► **Photo Facilities**—Camera equipment aboard the XP-11 includes a wide variety of types. In the camera area, mounted vertically, either a K-12, 14, 16 or 22 may be mounted. This is essentially the same as the new camera with different lenses. Also mounted vertically in the nose are two K-12 aerial cameras, which may be interchangeably with K-17 types, the aerial output for the lenses.

The third camera is the famous Frazer design, consisting of three K-17 aerial cameras, one mounted vertically, the other two projecting outward and downward on either side of the nose. To operate this equipment, an A-2 control panel is located in the nose cockpit. These latter are automatic film loading camera equipment with which are present to operate the camera at predetermined speeds and intervals.

Camera equipment may be operated either from the nose position in the nose or manually from the command operator's seat in the main cockpit.

To provide radio communication, a standard SCR-522 VHF command set is used. In addition, a liaison net, made up of an ART-33 and a SC-748 and address unit, is carried.

Research Review

Gyroscopic Loads on Jet Shafts Create New Design Problems

As result of NACA studies, Air Force has added requirements believed sufficient to cover future larger engines.

By ROBERT McLAUREN

The high rotational speeds and long, narrow length of turbojet engine shafts create a gyroscopic effect, in rotating members of the airplane, create considerable internal structural loads that must now be added to the picture of the aircraft designer.

These new internal loads can rise to such magnitudes that failure of the shaft results and Air Force engineers now assess the possibility that a number of untested turbojet airplanes and engines of jet fighters may be subjected to shaft failure resulting from gyroscopic loads. As a result, the factor is now a design requirement for turbojet engines of USAF.

► **Resistance Formula**—A rapidly increasing gyroscopic loads to most aircraft of its weight in space. This resistance varies with the dimensions of the disc and its speed as follows: gyroscopic force is

$$\frac{W^2 R^2 N^2}{4 \pi^2 I}$$

in which

W is the weight of the disc

R is the radius of gyration

V is the linear velocity of shaft end in the distance from the disc to the shaft end

N is the disc rpm

It is evident that gyroscopic force increases with an increase in the disc weight, the diameter of the disc, the speed of the disc and the rate-of-change of the shaft axis. This force decreases with an increase in length of shaft, which, in the case of a turbine shaft, refers to the short end projecting forward from the compressor and aft from the turbine. In most designs this distance is extremely short.

► **Increasing Importance**—Since these conditions that allow shaft to disc and engine speed of turbojet engines continue to increase, gyroscopic loads will become increasingly important. Assuming a shaft in a jet fighter is steady level flight suddenly pulls back on the control column, the turbine shaft twists this motion and applies a downward load on the front bearing and an upward load on the rear bearing. Should either of these bearings fail, the shaft would no longer through the center of the

rotating bearing. In addition, as the turbine shaft twists the motion of the airplane nose upward it automatically creates a load tending to turn the airplane to the right, twisting it a side load on the bearings and the shaft. Pushing the control column forward would cause a gyroscopic force tending to turn the airplane to the left.

Intensity of these forces on a given installation varies directly with the rate-of-change of direction of the airplane. For example, a sharp pull-up would create loads considerably greater than a reasonably gentle pull-up. A jet fighter flying at high speed cannot create high rate-of-change motions, or angular accelerations, as easily as it can be created at slower speeds with its high kinetic energy. For this reason, highest angular accelerations are usually obtained in steep climb and the worst design condition is a combination of gyroscopic loads and a rate of climb.

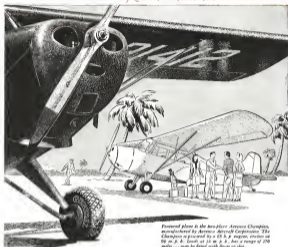
► **NACA Study**—To determine a rational design criteria, The National Advisory Committee for Aeronautics obtained information on the operating characteristics of more than 100 airplane models and flying jet airplanes in regular accelerations as high as 7 g's per second have been recorded, with an average value of 1 g's per second. These were compared with static tests.

As a result of this study, the Air Force has now specified an angular acceleration of 15 radians per second in yaw for 10 seconds as a basic design requirement for turbojet engines. In addition, a peak value of 20 radians per second for 2 seconds must be incorporated in the design.

Air Force and industry engineers point out that, having an increased high-speed yaw, such as during violent maneuvers, existing systems are of moderate rate of turbine twisting and shaft failure through fatigue forces. However, the new requirement is designed to accommodate future turbojet engines with higher power and larger size as well as better stability systems.

REFERENCE

Compt. H. M. Note on Maximum Airplane Angular Velocities NACA Wartime Report W-161



Featured plane is the two-place Avrocan Champion, manufactured by Avrocan Aircraft Corporation. The Champion is powered by a 65 h. p. engine, cruises at 90 m. p. h., lands at 33 m. p. h., has a range of 200 miles... may be fitted with floats or skis.

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Designation
Combustion Symbols

Symbols for Combustion Research

These symbols have been recommended as standard designations in the field of combustion research by the National Advisory Committee for Aeronautics' Subcommittee on Combustion. They are used as facilitating exchange of technical information by providing uniform nomenclature to be used as a basis for comparison of results.

Included to complement other NACA lists of symbols for specialized phases of aeronautics, this compilation maintains consistency, wherever possible, with accepted usage in aerodynamics and thermodynamic studies.

Though these symbols may not appear in common NACA literature or that in process during the subcommittee's deliberations, they will be applied to future publications.

Dr. NACA's combustion subcommittee are personnel from Massachusetts Institute of Technology, Air Materiel Command, Bureau of Aeronautics, National Bureau of Standards, Bureau of Mines, NACA Cleveland Laboratory, John Hopkins University, Princeton University, General Electric Co., Standard Oil Development Co., and Westinghouse Electric Corp.

Symbol	Quantity	Dimensions	Typical Units
A	Area, cross-sectional	D ²	ft. ²
v	Velocity of sound = $\sqrt{\frac{\gamma p}{\rho}}$	L/T	ft./sec.
v _c	Specific heat at constant pressure	D ² /T	Btu./lb. °F.
v _v	Specific heat at constant volume	D ² /T	Btu./lb. °F.
C	Coefficient	none	none
C ₁	Concentration; mole of substance "1" per unit volume	m ³ /D ³	lb. mole/ft. ³
D	Diameter	L	ft.
e	Specific internal energy	D ² /T	Btu./lb.
f	Fuel-air ratio	none	none
F	Flux; heat	m ² /D ²	B.
g	Standard acceleration of gravity	L/T ²	ft./sec. ²
h	Specific enthalpy	D ² /T	Btu./lb.
h ₁	Total specific enthalpy	D ² /T	Btu./lb.
h ₂	Specific (lower heat) of combustion; (lower enthalpy change) for isothermal constant-pressure combustion with product water remaining in vapor phase	D ² /T	Btu./lb.
h ₃	Specific enthalpy of expansion at constant pressure	D ² /T	Btu./lb.
J	Mechanical equivalent of heat	none	none
K	Constant	none	none
L	Length	L	ft.
m	Mass, total	m	slugs
M	Mach number; also molecular weight	none	none
n	Polytropic exponent	none	none
p	Absolute static pressure	m/D ²	lb./ft. ²
p ₀	Absolute total pressure	m/D ²	lb./ft. ²
q	Dynamic pressure; 1/2 momentum flux per unit area	m/D ²	lb./ft. ²

(Included on page 82)

Symbol	Quantity	Description	Typical Units
Q	Total quantity of heat transferred by radiation, convection, or conduction (also volume rate of flow)		Btu Btu/hr
r	Pressure ratio		none
R	Delivered gas constant		Btu/lb. °F
r	Specific entropy		Btu/lb. °F
s	Area, surface		sq. ft.
T	Time		sec.
T	Absolute static temperature		°Rankine
T ₀	Absolute total temperature		°Rankine
v	Specific volume		ft. ³ /lb.
V, v	Velocity		ft./sec.
W	Weight flow per unit time		lb./sec.
w, w	Specific heat ratio, c_p/c_v		none
x	Static pressure divided by NACA standard sea-level pressure (29.92 in. Hg)		none
x ₀	Total pressure divided by NACA standard sea-level pressure		none
Δ	Finite change or difference		none
η	Efficiency		none
θ	Static temperature divided by NACA standard sea-level temperature (59° F)		none
θ ₀	Total temperature divided by NACA standard sea-level temperature		none
λ	Wave length		ft.
μ	Absolute viscosity		lb. sec./ft. ²
ν	Kinematic viscosity		sq. ft./sec. ft. ² /sec.
ρ	Specific density		slugs/ft. ³
ρ ₀	Specific density divided by NACA standard sea-level density (0.002378 slugs/ft. ³)		none
τ	Ratio of two static temperatures, the absolute static temperature of a thermocouple		none
τ ₀	Ratio of two total temperatures		none

SUBSCRIPTS

a	axial	1	first
ad	adiabatic	k	last exchange or interactor
amb	ambient	i	indicated
av	average	0	isentropic
b	burner or burned gas	1	jet or exhaust nozzle
c	compressor	n	nozzle or exit
cd	critical	st	NACA standard sea level
cd	critical	std	standard
com	corrected	t	total or surface
d	diameter or duct		

Subscript notations are used to indicate position in an apparatus, process, or cycle. When used to indicate stations in a burner, the numbers assigned to the stations shall increase from left to right.

HOT ROCK CHARLIE
SAYS RULES ARE A BORE
THINK HE'LL LIVE LONG ENOUGH
TO KNOW WHAT THEY'RE FOR?

**PLAY IT
SAFE
WITH...**

Painted above as one sure way to keep your plane from growing old. A less hazardous method in the proper finishing of aircraft. Murphy formulations for finishing, refinishing, and maintenance are designed to help keep planes youthful even. You'll find them at airports and rebuilding shops the country over or write: Interchem Corporation, Teachers Division, 350 Fifth Avenue, New York 1, N. Y.

Interchem Aircraft Finishes
Engineered by MURPHY-ROXALIN

Bendix AVIATION Radio



Mantz thanks Bendix Loop
for 77-second victory margin!



Paul Mantz, winner of the Bendix trophy race, credits the new Bendix ADF Loop for his 77-second margin of victory in the 2,048 mile, 1947 transcontinental contest from Van Nuys, California to Cleveland, Ohio. "The Bendix Loop," said Mantz, "provided me with sure radio navigation throughout my cruise without the added drag of older style loops."

Mantz also gave credit to this navigational aid in setting a new low on West transcon and record low on New York to Burbank, California on 7 hours, 4 seconds, 27 minutes, 56 seconds less than the previous record. Such outstanding performance and reliability proves again the continued operating efficiency in high speed straits available with Bendix Radio navigational equipment now used by major airlines worldwide.



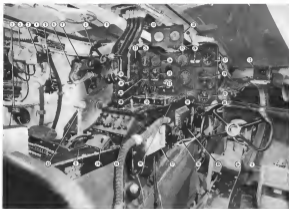
MIN-HA LOOP REDUCES AIR DRAG TO ONLY 0.27 POUNDS AT 100 M.P.H.

Use of an loop over loop results reduction in air resistance equal photo indicator of larger loops. A few inches of Bendix loop saves the horsepower needed to fly an aircraft at altitude, unencumbered, and more handling. A constant operational zero resistance and Bendix circuitry directed bearings in a recent indicator with accurate efficiency.

BENDIX RADIO

BENDIX RADIO DIVISION OF
BENDIX AVIATION CORPORATION
BALTIMORE 4, MARYLAND

Wm. Cecil Branch, 1227 Airway, Bethesda, D. C. 20814



Flying Wing Has Novel Cockpit Layout

Although housed in wingcase leading edge, cabin displays compact instrumentation and controls. Unobscured vision insured.

Absence of space usually available for cabins in conventional aircraft prevented distinctive limitations on location of equipment and personnel in the Northrop B-35—a problem possibly as serious, in its way, as the overall aerodynamic and structural considerations incorporated in the design of a large Flying Wing.

Despite this, the plane's cockpit arrangement features good visibility of instruments, convenience to controls, and excellent light-visibility.

Pilot and copilot are disposed at dihedral levels—the pilot operator, from the overwing bubble located to left of craft's centerline, copilot sits below, to right of structure in cockpit gutter, directly behind the "greenhouse" window in the wing leading edge.

Only necessary flight instruments are included in pilot's vertical panel, which sits at left side of copilot's window.

Raising aft from base of this vertical installation is the pedestal panel separating pilot throttle and carrying control and lighting switches.

Instruments for engine and propeller operation are separately located on the right engine's panel to rear of cockpit. Photo shows cockpit arrangement in second B-35. Installation is essentially similar to that of first craft and will probably be incorporated, with small minor revision, in subsequent B-35s.

Details designated in photo are: (1) emergency egress air dump control, (2) pilot's radio switch box and filter, (3) breaker (VHF) control, (4) retract light, (5) oxygen regulator, (6) nose wheel steering and parking brake control handle, (7) pilot's oxygen instruments, (8) pilot's control column, (9) emergency air brake control handles, (10) pilot's throttle, (11) copilot's oxygen instruments, (12) magnetic

compass, (13) rudder and brake pedals, (14) copilot's control column, (15) rudder control box, (16) engine regulator, (17) switch box and filter, (18) pedestal switch panel, (19 and 20) emergency radio receiver controls and transmitter control box, respectively, (21) flap control switch, (22) landing gear control handle, (23) flight indicator, (24) engine oxygen indicator, (25) rudder indicator, (26, 27 and 28) back and taxi, rate of climb, and flight indicators, respectively, (29) altimeter, (30) fusage thermometer, (31) turn indicator, (32) tachometer, (33) manifold pressure gage, (34) radio compass indicator, (35) tachometer, (36) landing gear and glide path indicators, (37) manifold pressure gage, and (38 and 39) rate of climb and bank and turn indicators, respectively.

Pushbutton at upper right extremity of copilot's control column (upper left on pilot's) is for microphone control. Behind wheel at this location is another pushbutton, pressed when handles are applied, air closing circuit to released valve, allowing hydraulic pressure to cover brake system.

FELT SEALS RETAIN LUBRICANTS, EXCLUDE DUST

Two Basic Types of Felt Seals, Applicable in a Wide Variety of Designs, Solve Mast Sealing and Packing Problems

The unusual and unique properties of felt make it especially suitable in sealing and packing applications. Such uses are increasing steadily as more and more engineers and designers appreciate the simplicity of application, reliability of performance, and long life of felt. For many machines in which it is necessary to retain bearing lubricants, and feed them automatically and uniformly as needed, or from which dust, fumes, or moisture must be excluded, felt seals and packings meet your requirements.

PHYSICAL CHARACTERISTICS

The physical characteristics of felt that make it so highly suitable for such are absorption capacity, low coefficient of friction, and resilience. Oil absorption capacity is high, and is largely a function of felt density. Table 1 gives the absorption rates of American Felt Company's standard SAE felt for a range of commercial grade lubricating oils. However, any type of felt suitable for sealing purposes generally holds enough oil to give reliable performance without additions between major overhauls. The coefficient of friction averages 0.22 for dry felt against steel, which is reduced to 0.12 when the felt is pre-saturated with oil at 41.2 Sgals viscosity at 200°F. Because of its resilience, felt maintains a constant sealing pressure regardless of wear, swelling, minor misalignment or non-round conditions of metal shafts and assemblies. Another important advantage of felt is that if it should run dry as a result of operation past the time for overhaul, it tends to polish rather than score a shaft. Under normal bearing temperatures and speeds, felt will never fail through aging, embrittlement, or disintegration.

TWO TYPES OF SEALS

Plain Felt Seals. These are precision cut washers, produced by American Felt Company, with a tolerance of .005". They are cut from standard types of SAE Felt, and may be pre-



saturated with lubricant before assembly. The lubricant employed is generally one higher in viscosity than that which is to be retained. Such seals have only two limitations; they should not be used to retain oil of extremely low viscosity, nor to retain pressurized lubricants. For each service, the best material and construction should be used.

Laminated Felt Seals. In these, the plain felt seal is combined with one or more impregnated sections of 1/16 to 1/32 inch sheet styrene. The felt may be of the same density throughout, or felt of different densities may be used on opposite sides of a section. Thus a laminated seal can have felt of high density and oil retention capacity on one side, and on the other side a lower density felt for dust exclusion. An example of this is seen at (c) in the drawing, which shows a rough-cut washer that combines lubricant retention, sealing, and dust exclusion.

TABLE 1—OIL ABSORPTION CAPACITY OF SAE FELTS AT 20°F

SAE No.	Felt Density (lb./cu. in.)	SAE OIL VISCOSITIES						
		SAE 10	SAE 20	SAE 30	SAE 40	SAE 50	SAE 60	SAE 70
SAE 10	0.110	1.010	1.770	2.210	2.670	3.120	3.570	4.020
SAE 15	0.130	1.095	1.870	2.320	2.780	3.230	3.680	4.130
SAE 20	0.150	1.180	2.050	2.500	2.960	3.410	3.860	4.310
SAE 25	0.170	1.265	2.135	2.580	3.040	3.490	3.940	4.390
SAE 30	0.190	1.350	2.220	2.660	3.120	3.570	4.020	4.470
SAE 35	0.210	1.435	2.305	2.740	3.200	3.650	4.100	4.550
SAE 40	0.230	1.520	2.390	2.820	3.280	3.730	4.180	4.630
SAE 45	0.250	1.605	2.475	2.900	3.360	3.810	4.260	4.710
SAE 50	0.270	1.690	2.560	2.980	3.440	3.890	4.340	4.790
SAE 55	0.290	1.775	2.645	3.060	3.520	3.970	4.420	4.870
SAE 60	0.310	1.860	2.730	3.140	3.600	4.050	4.500	4.950
SAE 65	0.330	1.945	2.815	3.220	3.680	4.130	4.580	5.030
SAE 70	0.350	2.030	2.900	3.300	3.760	4.210	4.660	5.110

1. Includes thickness of felt.
2. For Cast Weight Lubricant at Operating Pressure as Recommended by Volume Displacement Method at 20°F.

The impregnated options may also be on only one side of the washer, as in (k). The multiple laminations of (c) to (r) indicate an further modification, developed for progressively more difficult conditions of sealing operations. In each case, the impregnated layer of styrene (1/16" thickness) acts as a positive dust against low viscosity lubricants. These seals will also withstand a moderate amount of lubricant pressure.

IMPREGNATIONS

Both plain and laminated felt seals may be impregnated with standard grades of oils and greases, or special treatments may be used to meet unusual conditions. For maximum friction, increased graphite is employed. For permanent adhesion, or to exclude water or acid, impregnations of paraffin, stearine, or graphite are sometimes used, as in engine stuffing boxes and plunger valves, and in other critical sealing applications. The versatility of felt for sealing purposes is one of its important advantages.

DESIGN CONSIDERATIONS

Each plain and laminated felt seal has a rectangular cross section. The inside diameter of the washer is from 0.002" to 0.004" less than the outside diameter of the shaft over which it is to fit, depending upon the type and density of the felt applied. Thickness of the washer also depends upon the type of felt, and increases with shaft diameter. Some typical designs are shown in Fig. 2.

Turned or chamfered bevels are preferably designed with tapering sides in the form of an annulus tapered with the sides in axial from 4° to 7°. This taper serves to compress the washer radially inward, effecting a constant pressure on the shaft. In the case of custom glass or packing glass where the design requires that one wall be at right angles to the shaft, the inner wall of the bearing should be flattened.

SELECTION

Felt seals, plain or laminated, are recommended where operating temperatures are between -50° and 250°F., and where peripheral shaft speeds do not exceed 2000 feet per minute. Since felt is an engineering material, thoroughly understood, selection of the proper type to meet any given condition within the above range can be made with complete confidence. In general, SAE F1, F2 and F3 felts are used for dry-cut oil or grease retaining conditions, with shaft speeds over 1000 feet per minute. SAE F5, F6 and F7 felts are employed for lubricant-retaining washers at shaft speeds between 150 and 1000 feet, and also for difficult enclosing conditions at speeds over 1000 feet. SAE F10, F11, F13 and F15 felts are suitable for lubricant retention at shaft speeds less than 150 feet per minute, and in dust-excluding washers, for shaft speeds less than 1000 feet per minute. SAE F-60 felt is employed in precision ball bearing seals.

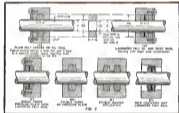
FORMS

American Felt Company supplies felts for seals either in roll or sheet form, or cut into washers to your specifications. This felt is in abundant supply, uniform in quality at all end use, delivered as prompt, and in most cases the felt washers are the lowest cost parts of a given machine or assembly.

COLLABORATION

American Felt Company engineers will gladly collaborate with you in such matters as design of seals and selection of the proper type of felt. The material in this advertisement is a collaboration of felts given in American Felt Company Data Sheet No. 11, "Felt Seals, Their Design and Application." This contains additional technical information, such as tables showing oil absorption capacity and dimensional tolerances and degrees of bearing compression for plain and laminated felt seals. The eight-page Data Sheet is the outstanding paper on this subject. A copy will be sent you if you will write your request on your letterhead.

SAE Felt Design	(plain and laminated felts)	APPLICATIONS
F1	1/16" x 1/16"	Oil seal on engine rotating shaft
F2	1/16" x 1/16"	Seal and dust exclusion on shaft
F3	1/16" x 1/16"	Seal and dust exclusion on shaft
F4	1/16" x 1/16"	Seal and dust exclusion on shaft
F5	1/16" x 1/16"	Seal and dust exclusion on shaft
F6	1/16" x 1/16"	Seal and dust exclusion on shaft
F7	1/16" x 1/16"	Seal and dust exclusion on shaft
F8	1/16" x 1/16"	Seal and dust exclusion on shaft
F9	1/16" x 1/16"	Seal and dust exclusion on shaft
F10	1/16" x 1/16"	Seal and dust exclusion on shaft
F11	1/16" x 1/16"	Seal and dust exclusion on shaft
F13	1/16" x 1/16"	Seal and dust exclusion on shaft
F15	1/16" x 1/16"	Seal and dust exclusion on shaft
F-60	1/16" x 1/16"	Precision ball bearing seal



American Felt Company
TRADE MARK

Engineering and Research Laboratories: Greenville, Conn., PLANT: Greenville, Conn., Franklin, Mass., Northvale, N. J., Detroit, Mich., SEALS DIVISION: New York, Boston, Chicago, Seattle, Cleveland, St. Louis, Philadelphia, Atlanta, Rochester, Buffalo, San Francisco, Los Angeles, Portland, Seattle, Reno and



B-36A IN PRODUCTION

New view of the first Consolidated Value production B-36A designated the A, which will be flown to Wright Field for use as a flying state test model. The simplified instrument panel of the cockpit compartment is shown at top left. A flight engineer toward the rear of the cockpit has the main banks of instruments. Pilot's side window is also apparent through use of the bubble canopy, shown from outside at lower left. This is a refinement of the original XB-36 canopy. Four engine nacelles also are seen. Above is shown the four wheel nose landing gear which replaces single wheels formerly used.



All American Closes Manufacturing Plant

All American Aviation, Inc., Waltham, Mass., has announced that it will discontinue its sheet metal and machine shop activities, which since the war comprised the manufacturing division of AAA.

Robert M. Love, president, pointed out in a letter to stockholders and employees that the manufacturing division sustained substantial losses.

He added that All American was not an established manufacturer prior to the war "and faced the problem of developing an entirely new business rather than the problem of reconstruction."

"Existing contracts held by the manufacturing division will be completed," Mr. Love said, but properties and facilities for manufacturing will not be disposed of at present.

The company in the future will concentrate on its air pickup service.

Engineering activities of All American Aviation, Inc. will be the aircraft shop at DePaul Airport, which will be affected by the change.

GE Negotiating with Bell For Vermont Plant

Negotiations are under way for sale or lease of Bell Aircraft Corp.'s manufacturing plant in Burlington, Vt., to General Electric Co.

Operated by Bell during the war, the Burlington plant was purchased in 1946 by the company from the War Assets Administration for a price of \$660,000.

Many of its contracts have now been completed. Production of other items will be shifted to Bell's Niagara Falls plant. Transfer of this additional manufacturing to Buffalo is expected to result in the utilization by Bell of additional space, now unused, in the F-16 plant.

While officials of Bell declined comment on the negotiations at this time, it was reported that General Electric has sent a questionnaire to Burlington to make a survey of the plant.

During the war, the Burlington plant was Bell's Ordnance Division and it was the company's original intention to continue in the Vermont factory production acquiring precision work.

Low Noise-Level Cabin Announced by Martin

Whitman engineers at the Glenn L. Martin Co., Baltimore, have lowered the noise level within the cabin of the Martin 2-0-2 to 70 decibels—equivalent to at least 100 ft. in the average transport plane now serving the flying public. Company claims the new two-engine lowly liner, will offer greatly increased power and speed, will offer its passengers flying conditions never experienced by air travelers.

As a result of research in this field, it has been discovered that the noise level in the 2-0-2 cabin is lower than the minimum customer requirement of 50 decibels.

For closer comprehension of sound level measurements, comparison of decibel ratings may be made with average decibel ratings of business planes still in operation. Landing 75 decibels, offices 70 decibels, construction 60 decibels, automobile passing 70 decibels, truck passing 84 decibels, auto horn 120 decibels. Therefore, the noise level in the cabin of the 2-0-2 is very low above that of ordinary modern speech.



Westchester County Airport showing present installation. Instrument approach runway runs lower left to upper right. (Steve photo)

Westchester's Airport Problem Simplified Through Leasehold

Agreement made with operator to run field and expand facilities after government abandoned project. County officials, caught off guard, were unprepared to handle operation of an airport.

By ALBERT E. SMYSER, JR.

Westchester County Airport, Inc., N. Y., 3 miles northeast of White Plains, was lost by the Government during the war for use of an area guarding the metropolitan area. When it was abandoned in 1945—the color establishment was turned over to the county. Then had been no construction after money was completed, as the county owned a probably better three runway "white elephant" instead of the complete airport that had been expected. Having no place for an organization capable of leasing such a project, they asked that help be solicited for an operator to lease the field and expand its facilities.

The airport, with concrete runways, one 5,000 ft., one 4,770 ft., and a third 4,550 ft., is now leased to the North American Airpark Corp. (owned by Gulf Refining Co.), on a 15 year lease.

Activities—Corporation now operates flights and ground schools using both private and G. I. students, maintenance and repair shops for engines and airplanes, distribution for Aeronautics lightships, sales agency for Republic Seiners, a plane servicing station, and a mailbar.

Westchester Inver, under CAA control, is equipped with the latest radio aids, including complete low and medium frequency receivers and VHF trans-

mitters and receivers fitted with integral warning devices to avoid an crash in the event of equipment malfunctioning.

Field management requires that all aircraft operating from this airport possess a minimum of a serviceable engine receiver. All aircraft used by the flight section are radio-equipped, ensuring more orderly traffic flow under positive tower control, and reducing the hazards frequently found at fields where instrumented and commercial flights are being made approach patterns.

Instrument Approaches—As U.S. mail landing system has been established and approved by CAA, with a 1,500 ft. path of main lights indicating the approach to the instrument runway. Land available for the extension of the 4,770 ft. instrument runway will be used when such a step appears necessary.

Present monthly plane movements according to CAA totals are about 26,700, an increase of over 20,000 per month since February.

Airlines' Request—With the approval of the instrument landing system came bids from several major airlines for use of the Westchester field as a provisional airport—to be used in the event weather conditions make hazardous traffic de-

Safer landings . . . fewer delays . . . with **BARTOW** beam-controlled high intensity lighting

APPROACH
AND
RUNWAY



At the US Army at Walsh County Airfield, Mississippi, St. Paul, showing new Bartow high intensity runway lighting as pilot sees it just before leaving. Range lights at Runway 10 are beam controlled with one shown at left.

Principles of Bartow Beam Control . . . How It Works

Lights are spaced at 200-foot intervals along the runway. As the pilot approaches, he sees two rows of lights, appearing the runway and giving him maximum perspective. Under normal visibility, the last part of the runway sends two fingers of light to the plane where the pilot will be when he sees it, so he gets all information and one visual contact.

As he moves forward another 200 feet, he sees on the runway part of the second part of runway. He still sees the first part, but sees through it to those in line. He is just out of their point of focus, and they appear no brighter than the second and subsequent parts. All appear as equal lights, because the light beams reach him at different angles. There is no glare to obscure the next light ahead.

Why for this feature, "The Lights that Fly Like You"

A unique application of the principle involved in approach and runway lighting. Illustrated with range charts similar to those in the opposite page. If you are concerned with runway lighting, send for a copy. It can save your money on business. Contact: Air Line Material Company, Airport Lighting Division, Bond Street, Philadelphia.



Maximum safety, minimum pressure, low stacking up and shorter landing time. Fewer cancellations and delays—these are some advantages of Bartow high intensity approach and runway lighting system.

Airline landings are made rapidly, safely, under low visibility conditions, without reducing present proved maximum safety standards. When, for example, reported ground visibility is given as 50 miles, Bartow lighting increases output visibility of the runway to one mile.

This lighting was first developed over 20 years ago by Bartow Beams, Inc., and with the cooperation of L.M. lighting engineers, has been steadily improved. During the war it was installed by the Army and used at hundreds of bases throughout the world. Pilots who flew in the Albatross, Bantam, and other high flying army jets tell you what Bartow lighting did to bring them in at safe landings.

"Canned-in," and stepped up

When dark, fog, rain or snow is out, daylight glow leaves the visibility, light intensity is stepped up, and before an "outlet" is used it is so that better than each side of the runway sees the greatest distance maximum power. Each set has up to 24,000 lens condenser to push the light through nearby weather. In clear weather intensity can be cut as low as one percent.

Only two simple controls

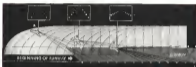
Intensity and focus are controlled from the tower. One five-point switch changes eyes on the condenser to change the colors. One toggle switch moves a pointer back and forth to the required "visibility" figure on a day or night chart—no sophisticated meters to read and use the figures of light in precisely the right spot. It's so simple so that:

The L.M. Beamco lighting is the only completely one-man system, and has the highest light intensity of any runway system developed to date. Usually it is the most economical to install. Units give 200-degree visibility but concentrate the light without glare where it is most needed—directly the pilot.

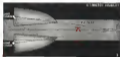
Fully approved by CAA

The Bartow system is the first high intensity lighting given full CAA approval—the only one flight-tested and fully approved to date. This lighting, combined with approved instrument system, gives maximum safety for all weather airport operations.

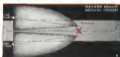
Charts show principles of Bartow Beam-Control



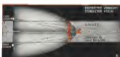
2. Effective envelope of light, in clear atmosphere, of one pair of lights—one on each side of the runway. Each light is of equal brightness along the center line of the runway. (To simplify this explanation, only one pair of lights is shown, although the pilot always sees two rows of lights, one on each side of the runway.)



3. Restricted visibility: the envelope of light extends in fog, dust, etc. Penetration of the high condenser lens is reduced more than the low condenser lens, and the effective area left away from the center line of the runway. This lighting would be ineffective—the pilot could not see the light even if he were in the right position.



4. Increased intensity: close does not reduce the peak of equal brightness shown in chart No. 3 above. Increasing the condenser increases the penetration of the low condenser lens, but the high intensity beams are still not reaching the pilot, leaving a dark patch in the center from which the lights are not visible.



5. Corrected Beam Direction, with lights "stepped" toward the center line of the runway, concentrates the dark area, ensuring the path of equal brightness. Thus the center line of brightness control and beam direction could give maximum penetration, without glare or halo, under any given atmospheric condition.



LINE MATERIAL AIRPORT LIGHTING

11000 W. 10th Street, Denver, Colorado 80202 • Telephone: (303) 751-1100 • Telex: 150000 • Cable: Line Material • Airport Lighting Division • 11000 W. 10th Street, Denver, Colorado 80202 • Telephone: (303) 751-1100 • Telex: 150000 • Cable: Line Material

"I chose Esso Aviation Products for...Fine Performance"



ALBERT H. MUNKKE, captain of the U.S. Postal Aviation (1948), served mostly short routes in the West until 1949 when he switched to express flights from Anchorage, Alaska, to Fairbanks, Alaska.

"I chose Esso Aviation Products for their uniformly high quality and fine performance, and because of the interest shown by the Esso Personnel in furthering private flying. Because of the deep interest, Esso makes available to the operator much valuable information and technical know-how. Their aviation representatives continue to be most helpful as new problems arise in our rapidly expanding output."

(Signed) Albert H. Munkke, President

As president of one of the nation's most fast growing cargo air carriers, Albert H. Munkke knows that where competition is keenest those things are rightly important: high quality products... dependable service... helpful cooperation. Mr. Munkke enjoys all of these in his partnership with Esso.

Add the "technical know-how" for which Esso is famous and you find still another big reason why so many airport operators from Maine to Texas prefer Esso Fuel and Lubricants for fine performance. For all-important customer satisfaction at your airport... sell Esso Aviation Products!



Flying Farmers Log 247 Hours Per Year

The average flying farmer flies approximately 247.2 hr. a year, or well over the 200 hr. which aviation clubs in the aviation promotion program can be operated commercially, according to a survey compiled for the National Flying Farmers Association by H. A. Collier, executive secretary.

The survey, tabulated on the basis of 358 replies from 24 states to a mailing of 2,350 questionnaires to representative members of the association showed that for the entire group flying the 74 aircraft models that had been represented included only one biplane and four piston engines in 245,906 flight hr. or 22,064,100 miles.

Average Pilot Statistics—The average pilot among those replying is 34 years old and has flown 434 hr. or 39,510 miles on the basis of 90 miles an hour. He has had one accident for every 3,304 hr. of flight, at an average of 207,109 miles, and has flown an average of 28.8 months.

Of the 508 airplanes owned by the group, 464 are piston engines, 44 are biplanes, while only 36 (15 percent) carry some type of insurance.

Total costs for plane repairs amounted to \$24,439.57 with three planes damaged and not repaired.

Analysis of the composite picture indicates that the average farm pilot is an older, more careful, more experienced pilot than the usual flier, and one who uses his airplane on a utilitarian basis. Survey results confirm the conclusion by various personal plane market analysts that the farm pilot is probably the best investment prospect for personal plane sales. It indicates that he considers personal plane ownership costs too high, at least for his type of solo flying. (It is estimated that NFPA is studying a new low-cost group insurance plan for its pilots, which may meet this need.)

Plane Summary—Summary of planes owned by farm pilots replying part after part in the total with 108 planes, Aeroce standard with 55 and Taylorcraft third with 78. Other types include Cessna or light, miscellaneous, 45; Luscombe, 45; Stearman, 25; Stearman, 16; Fairchild, 9; Valair, Cucker, and Callair, four each; Interstate, Swift, Boeing, Navion and Puck, three each; PT-18, Pottersfield, BT-13 and Dart, two each; and Curtiss, Harvard, VIVN, Bellanca, PT-25 and Epps, one each.

Two Lear Distributors

Loew, Inc., Grand Rapids, Mich., has announced appointment of two additional Cessna Aircraft sales distributors, Flight, Inc., of Cleveland, and Gulf Aeromobility of Dallas.

BRIEFING FOR DEALERS AND DISTRIBUTORS

HIGH ROAD TO SOUTH AMERICA—Alfredo de Los Rios, veteran export representative who recently made probably the first 35 hp. stock model airplane flight to South America and from there that country in a round-trip in a few weeks, but this time he will represent any single airplane company. His first trip was a delivery flight of an all-metal 85 hp. Luscombe, to San Paulo, Brazil, which also included demonstration flights on route. His next trip will be made in his own airplane, a piston Cessna, standard except for an extra fuel tank now being installed for use by Superair Aircraft of Wichita, Kan. The company which took over the Cucker parts and manufacturing plant recently. He has made arrangements to represent Southwestern Airmotive of Dallas on their various aviation accessories and equipment, and also some non-aviation manufacturers of agricultural machinery and power tools. During his first trip of 250 all hours, he traveled more than 10,000 miles, his longest solo, with his longest flight of 600 miles, 200 of which was over water between Trinidad and British Guiana. Alfredo sees a considerable market for American airplanes in South America, particularly in the north country, and for air taxi service, which is rapidly growing in Brazil and Argentina due to the inaccessibility of other methods of travel. Stinson five-place Vagabond are being extremely used for air taxi service in the mountains. South America seems to prefer conventional gas airplanes to bicycle gas planes and some difficulty has been experienced with new American tricycle gas planes in South American grass fields in southeast and profligate benches, due to nose-overs, etc., he reports. Alfredo visited a number of the small air fields, which he says are becoming an important feature of most of the larger markets. His flight included some mountain country flying several to 6,000 ft. altitude and considerable instrument flying, necessary, he said, to maintain his schedule.

FLIERS TRAVEL BY BUS—Report from Gene Ryhoff, head of Missouri's aviation section, division of research and development, on the Clark Field Route for Vagabond, is a good indication of what is to be expected in the near future. Before personal and business flying will have all round utility. Some 50 planes from Missouri, Illinois, Iowa, Kansas and Oklahoma flew into Springfield, and 15 managed to make it into Boston. But the tail end of the route's barometer made it necessary for the rest of the private fliers to go from Springfield, to their destination, Rockwell Beach or Lake Tawasson, by bus. And some pilots even made the whole trip by auto instead of by plane. From reports, it was a good social gathering anyway, which is the main thing as far as the tourist who accompanied, but it still points up pretty emphatically one of the main reasons why too many personal and business plane pilots still stick planes after a short period.

LODOWICK EXPANDS—Albert I. Lodowick, president, has announced expansion of Lodowick Aircraft Industries, Inc., Lakeland, Fla., to include facilities in Miami and Fortia Riva. Lodowick recently took over a large turbo-prop stock formerly handled by Eddy-Biddle Co. of Miami including many aircraft components and accessories and previously in charge of a large stock of miscellaneous airplanes at San Antonio, Dallas, Los Angeles, Spokane, Columbia, St. Louis, N. Y., and London, N. J. In addition to American sales, the Lodowick enterprises are exporting considerable quantities of the various aircraft to more than 20 foreign countries.

NEW PLANE RENTAL PLAN—Robert Boyer, manager of Philadelphia Air Service, Wings Field, Ardmore, Pa., and Central Airport, Gordon, N. J., is offering a new type of airplane rental plan, which is based on the conclusion that a rental plane which runs 24 hr. out of 24 makes money for the operator, being fully compensated on each hour of use, and that a rental plan should be offered to the other side. His rental cost very depending on the type of plane and his "table" includes Luscombe Vagabond 175s, Cessna, a Beech, Bellanca Cruiser 82, and Cessna 120 and 140, all equipped with radio and night flying equipment. Fuel and accessory expenses are an additional item rental cost. And if the pilot operator, he pays a charge of 10 to 15 cents an hour ground time depending on the plane, with no charge for colored buyers due to weather or maintenance.

STEADY AIRPORT EXPANSION—Probably the soundest indicator of the long-term steady growth of aviation is the continuing expansion in the number of airports in the U. S. Latest CAA figures show that in 1946 there were a total of 5,416 airports, of which 2,625 are commercial (that has operated) fields. This is a growth of 1,893 airports over the total for Sept. 1, 1946, and the growth in field base operations accounts for a large part of the total expansion, for 624 of the new airports are commercial.

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New Taylorcraft Firm May Stay in Alliance

Taylorcraft, Inc., now doing business in temporary buildings alongside the big Taylorcraft Aviation Corp. plant at Alliance, Ohio, is likely to remain in Alliance, despite offers from other cities to move the plant. C. G. Taylor, president, has indicated.

The TAC plant is now occupied by Avcozer & Co., which produced it at Taylorcraft site, but the newly organized Taylorcraft, Inc., which purchased other assets of the bankrupt organization, has plans for a new pre-orientated all-metal factory building in the immediate vicinity of the airport, if sufficient community support is given.

► New Plans—C. G. Taylor has plans for a four-place airplane with an engine than a 125 hp. engine, which he has designed to operate at low costs, with low landing speed for small fields and low size. He hopes it can sell for not more than \$1,500. He would like to make it all metal but feels this would be a later development after the first models are placed on the market. He is also planning two experimental aircraft types, the four-place model 13, and an all-metal two-place. His company indicated from its preliminary talks with the other assets purchased.

Taylor began his airplane designing career by reworking a World War I Curtiss B-4 Jenny trainer. Then he and his brother, Gordon, built a two-place plane called the Cherokee. The brother was killed in an accident, but C. G. Taylor went on to design the famous Taylor cub two-place with a 37 hp. engine. It built enough Taylor to drop out of the plane making business and out of his brother, William T. Taylor, took over and moved the plane factory to Lock Haven, Pa. Then Bradford, Pa. Soon, however, C. G. was back in business at Alliance, with the side-by-side Taylorcraft. From a small beginning, the plant grew rapidly. Five years ago, stock investors put a new management in at Taylorcraft, many of whose policies C. G., now as the individual, opposed. He set up in the interim a company making small electric welding machines which is still bringing him income. Over-optimism of Taylorcraft Aviation in the postwar lightplane boom followed and the company went into bankruptcy.

► Company Officers—The new company is owned, principally by aircraft dealers and distributors who bought stock in it to put the Taylorcraft airplane back in the market. Officers are Ben J. Mearns, Alliance, Ohio, president; C. G. Taylor, president; O. F. Nosselt, vice president; and sales manager; Bernard Kapp, secretary-treasurer.



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The steel used for such applications must have not only high resistance to corrosion, oxidation, and excessive heat but maintain these properties at extremely high temperatures and for many hours at a

stretch. The steel also must lend itself readily to forging, to gas, arc and resistance welding and other fabricating processes. Because U.S.S. Stainless Steel so admirably meets these requirements it has for years been used by Ryan Aeronautical Company, as standard construction for Douglas DC-4 exhaust systems and for similar equipment in the new Douglas DC-4 Airliners, C-54 Sky-masters and other famous planes. Our ability to furnish you with U.S.S. Stainless Steel to fully meet the needs for critical applications such as these, is due to two special assets — a manufacturing and engineering staff trained to think well into the future, and advanced Stainless Steel manufacturing techniques that have set new standards for high quality and uniformity.

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 UNITED STATES STEEL SUPPLY COMPANY (Warehouse Division), Chicago • UNITED STATES STEEL EXPORT COMPANY, New York



French Lightplane Designs Compared

New models shown in competition sponsored by air and transport agencies.

FARE—Five new French lightplanes, all entered in the recent 77-hp two-place lightweight plane competition organized by the Air Ministry and Transport Ministry, after intensive design contests for comparison study with contemporary American types.

Two finalists in the competition are the NC-518, product of the autonomous SNCA Caster factory, and the S-90, product of the Societe Industrielle pour l'Aeronautique (SIPA). Among other entries were the Lorraine AL-06 pusher, the AS-57, product of Societe des Avions Surock, and the all-metal SO-7050, product of SNCA Sud-Ouest.

Specifications and performance:

• **NC-518**—Development of four-place Chardonnnet (Aviation News, Dec. 16, 1946). Welded tubular fuselage, steel skin and fabric-covered wing. Conventional fixed gear. Span, 46 ft; length, 21.5 ft.; gross weight, 1,365 lb.; top speed, 185 mph.; cruising speed, 90 mph.; range, 310 mi.; takeoff run, 310 ft.

By end of September, ten of the planes are to be built, postponed at \$5,000. All-direction variability is provided by tail-wing joggles. Wings are strut braced.

• **S-90**—Conventional fixed gear, plywood construction with low, cantilever wing using single wood spar. Fuselage is spar-reinforced. Span, 25.4 ft.; length, 18.4 ft.; gross weight, 1,367 lb.; top speed, 115 mph.; cruising speed, 100 mph.; range, 310 mi.; fuel consumption, 34.5 mi./gal.

• **AL-06**—Metal construction, two-tail boom pusher, fixed tricycle gear. Span, 34 ft.; length, 21 ft.; gross weight, 1,457 lb.; top speed, 115 mph.; cruising speed, 100 mph.; range, 370 mi.

• **AS-57**—Conventional fixed gear. Wood and plywood construction with low cantilever wing. Span, 28.6 ft.; length, 21 ft.; gross weight, 1,520 lb.; top speed, 130 mph.; cruising speed, 145 mph.; range, 340 mi.; fuel consumption, 25 mi./gal. takeoff run, 290 ft.

• **SO-7050**—All metal low wing, fixed tricycle gear. Span, 36.4 ft.; length, 23.7 ft.; gross weight, 1,800 lb.; top speed, 124 mph.; cruising speed, 115 mph.; range, 310 mi.

Reading down: NC-518, AS-57, AL-06, SIPA S-90, and SO-7050 (WN Photo)

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Civil War Disrupting Indian Air Schedules

(McGraw-Hill World News)

NEW DELHI—Indian air transport schedules have been shut to pieces as a result of sporadic demands reported by the civil war along the border between Pakistan and India.

With train services disrupted and even shut down because of marauding bands in the Punjab the airlines have been called into the breach, at the expense of service in other parts of the country.

Biggest single fleet is the 33 planes chartered by the Pakistan government from BOAC. These, however, are not doing steady mileage work but are ferrying Pakistan government personnel into Karachi.

Center for Rotaxons—The radium work, directed by the Ministry of Civil Aviation, has fallen to the lot of the Indian lines led by Air India and Indian National Airways. Most of it goes under the head of "charter" work and consists of hauling wealthy loads and staffs from Lucknow in the Pakistan section of the Punjab.

The following rates have been set: Dabahu, \$1.50 per mile; Wazirpur, \$1.85; Kapurthala, \$2.00; Coasah, \$2.25; and Ferozepur, \$2.41.

The job it is a pleasant one, according to an crew general. Typical radium work is not so much the first variable success, and on at least one occasion pilots have been forced to approach to fly to other destinations to pick up someone who had not reported the aircraft through normal channels.

Irish Take Delivery On Five Constellations

(McGraw-Hill World News)

LONDON—Aerline Electric, Eire's state-owned trans-Atlantic airline, is taking delivery of five new "Gold-Finch" Lockheed Constellations, intended for coastal operations on Aerline's service from Shannon to Boston and New York. This is not scheduled to start until next spring's opening of traffic, in the States will be now, meanwhile in the Dublin-London service of Aer Lingus, Aerline's European route service.

Beginning early part of this month the operators will mark the first time the Constellation has been used for so short a haul. Visitors flying now see on the route, but it is expected the use of the larger planes will give the Irish operator good financial experience in preparation for the trans-Atlantic Aerline's pilots and crews have been undergoing training in the U. S.



British Jet Family Gets New Member

Napier Radial installed at Radlett shows other equipment displayed.

(McGraw-Hill World News)

LONDON—An addition to Britain's array of jet engines, the Napier Radial, an axial-flow turboprop, was shown for the first time at the Radlett exhibition of the Society of British Aircraft Constructors. It is the company's first venture into the gas turbine field.

About all that can be reported on the design is that it is a 1,500-hp, straight-through type of very conventional layout, with five combustion chambers and an intake through a hollow-shafted propeller shaft. Maximum diameter is only 28 inches. The Radial has been designed in an alternate power unit for the "Aerobanker" jet-turbine motor four of the design in place of its two Comausts and Napier say it is under consideration for several other planes as well.

The engine will make its first test flights soon in the form of a Lambda, and later will be fitted in the two-cylinder nacelles of some other plane. (Napier is no longer engaged in developing a jet design called the "Nymph" as an experimental engine test rig by the industry of supply.)

New Accidents—More than 180 suppliers participated in the engine and accessories part of the show. Chief among the auxiliary equipment displayed were three new designs of automatic pilots, two new automatic radio direction finders, a new single-channel VHF radio-telephone, and modifications of well-known radio-suspension units.

Smith's Instrument exhibited for the first time in any detail its electric pilot (which had been known at the Paris show last fall). This pilot operates on the rate feedback method of the conventional displacement type, and features inter-changeable gears and revolvers, with adjustments for each type of aircraft

through a standard junction box. Sperry Gyroscope Co. Ltd. displayed an extremely lightweight "pilot aid" operating on a pneumatic system driven off the low-pressure side of the engine. Weighing only 17.5 lb. including the directional gyro valve which most light planes are already equipped, the "pilot-aid" is intended to serve particularly the operators of personal and resource transport aircraft. Its design makes use of miniature electric motor based on a German type used in the V-2 flying bombs, and employs only pitch and roll controls, with electric potentiometer such that displacement is proportional to the amount of current flowing.

Miles aircraft showed its "in-pilot" air light switch, which employs a photo-electric pilot and operates about all these items.

Discussion—Fleming-McCord, and General Electric Company (England) Ltd., both displayed new automatic radio-direction finder designs. McCord's was the most finished and compact, with a spherical loop only 6 inches in diameter, a loop weight including the loop of 35 lb., and having a frequency range from 150 to 2000 kc. G.E.'s version, made by its British Electrical Instrument Division, is a design presented for the R.A.F., and makes use of a new shape of loop aerial, a flat-tuned pickup about the size of a standard-length oval, which can be accommodated in a shallow blister or in a flattened torus being much more compact than conventional design. Frequency range is 150 to 2000 kc.

For the small plane, re-examining an electrolytic requirement that all such circuits be equipped with R.F.T. in order to take off, G.E.C. has developed a miniature single-channel VHF transmitter-receiver which weighs only 54 lb., fits standard racks, measures 8 in. by 4 in. by 7 1/2 in., and provides two-way communication in any one of the civil aviation frequencies in the 113.3-131.9 mc band, as well as providing auto-cue facilities.

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Here's the easy way to remove paint from all metal surfaces. Skip the sanding and scraping. Strip it off with Whiz! It's safer, easier . . . leaves the surface ready for re-painting or polishing. Non-inflammable. Won't corrode aluminum. Conforms with AAF Spec. 114121B, Aerial, 1. It's a Whiz!

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NEW AVIATION PRODUCTS

Portable Aircraft Starting Unit

Compact, portable power unit for aircraft starting is latest offering of Pacific Aeronautics Corp., 2040 N. Hollywood Way, Burbank, Cal. Powered by steady power as well as necessary heavy starting current. Construction is of welded structural steel, and cabinet is

in section for easy maintenance filter and safety circuit terminals as well as power terminals. Designers say it can be used independently or connected to a duct system.

Power Cable Extender Rod

Easy extension of power outlets as hinges and on recept is made possible with new portable cable rod marketed by McCool-Chenier Co., 4922 S. Figueroa St., Los Angeles. It will handle up to 525 ft. of 1/2-in. dia. cable, weighing approximately 700 lb., or correspondingly greater lengths of smaller cable. Face end of cable comes male plug for attachment to electrical ground. A female connector—used within 100 ft. length and protected from weather—is only needed, hence cable need be secured only as far as required



sheet metal. Large rubber-tired casters (two front, one rear) give easy portability. Unit contains shock-mounted gasoline engine-driven generator rated at 70 amp capacity, and four heavy duty dc. batteries are isolated with cable and plug.

Dodge Canopies, Windshields

Used for substitution in aircraft to Dodge company, windshields, auto-diesels, and windoffs has been developed by Dynasac Air Engineering, Inc., 1419 S. Alameda St., Los Angeles 21. Covering high pressure metal flow bleaser and heater is single component assembly, typical model is No. 2256 (see photo) which delivers 60 cfm. at 2 or static



pressure (water gage) at heater adapter outlet, which is 1/4 in. dia. and has standard 1/8 inch temperature use with mounting air at 70 deg. F. is 68 deg. F. Weight is 19 lb., overall length, 9 in., and overall dia. 4 1/2 in. Corrosion resistant in 46 temp., 27% d. Constant



to reach a given head plug. Car is equipped with electronic triggered timing bar, drum bular, and also wheel lock to prevent movement after positioning.

Linear Acceleration Transmitter

Remote indicators of linear accelerations is transmitted by new Autolight unit made by G. M. Chausson & Co., Pasadena 1, Cal. Featuring light weight, small size, rugged construction, and high electrical output, instrument is specially intended for use with ground marker and radio-controlled navigation. With unit being designed to give a linear output proportional to large radial accelerations, there has been a stress on high sensitivity to quadrant accelerations. Mass weight is correspondingly designed so that systems per-



formance is obtained regardless of temperature at altitude. Ranges vary up to plus-minus 25 G., with higher speed breakable through special construction. Resistorless use from 100 to 20,000 ohms and dia. 1/4 in. Company has another version of semi-automatic instrument available which can be expanded from aircraft or ground, record, read, reset, and read again.

Shock Strut Pressure Gage

Improved shock strut gaging device is now being marketed in commercial aviation field by A. Schneider's Son, Div. of Soverel Mfg. Co., Bushkill, N. Y. Incorporating additional refinements to instrument developed during war with



components of Armed Forces, new gage provides on-line from 0 to 1,500 psi for job of safety checking, deflation, and gaging process of landing gear cylinders and struts.

Information Tips

Weld-Flow Tests

Announcement from E. J. DeWolf de Wolfson, a division of the American Welding Society, LaGrange, N. Y., states that a new portable electronic gaging device is now available to give the user up to 100 psi of water pressure in ordinary use. The instrument features a built-up hydraulic piston in use of a welded steel.

"Whisper" Test Spindle

Electrically induced gaging method, used in quality control, inspection, and test and laboratory units, are detailed in one of eight booklets prepared by Roger J. Brundage, Inc., Indianapolis 4. The principles of the electromagnetic testing unit, which provides "whisper" gaging are explained and there is a series of typical applications and also can illustrate the procedure. Further information from one-page form at special rate-gauge developed in production. Booklet will shipping listed during operations.

Win Duplex Lead-In Springs

"Lead-In" Spring "Factor" is new device which makes it possible to determine the "lead-in" spring factor of a spring. It is designed to give a reading in 1/2 sec. The device is made of stainless steel. Price, \$10.00. Write to Win Duplex, 12 E. Broadway, New York, N. Y.

Jungle Rescue...



Packet-helicopter teams which will provide a rescue service for any spot on earth are one of the goals of the Air Force.

The need was dramatically demonstrated recently when the Air Transport Command transported helicopters in Fairchild's Flying Boxcars to the jungles of Nicaragua. Crew members of the Flying Fortress lost in the almost impenetrable jungle were located and transported to safety by this efficient team.

The C-62 Packet, with its huge unobstructed cargo capacity and its range can also serve the nation in peacetime as a fast, versatile "plane of mercy", flying in and out of short airstrips wherever the emergency needs of floods, hurricanes and other disasters require. Together with a helicopter which can hover like a hummingbird over impassable terrain, they make an unbeatable team that offers welcome protection to civil and military aviation all over the world.

Fairchild Aircraft

Division of Fairchild Engine & Airplane Corporation, Garden City, Maryland

AIR TRANSPORT

CAB Orders Cargo Rate Probe But Refuses to Suspend Tariffs

Board's action is severe jolt to independent carriers and forwarders; certificated lines now in position to dominate airfreight field.

By CHARLES ADAMS

The certificated airlines' drive for leadership in airfreight touched the threshold of success early this month when CAB tacitly approved their latest slash in rates over the latter opposition of the independent all-cargo operators and the freight forwarders.

Both the forwarders and independent were shocked by the sign of the Board's order refusing to suspend the new tariffs of American Airlines, United Air Lines and Coastal Airlines (PCA), which came down to 13 cents a ton mile.

The suspension which last year accorded a number of all-cargo basic contracts carrier rights pending determination of their certificate applications was not a guarantee of protection against competition, CAB declared.

Investigation Ordered—While refusing to suspend the certificated airlines' latest freight rates, CAB ordered a probe of the tariffs filed by all parties, saying that "little preliminary evidence has convinced" and adding that "their relationship to each other is not clear."

Along with the American United and PCA Tariffs, the Board will investigate those filed by Slack Airway, the Flying Tiger Line, Air Cargo Transport Corp., California Eastern Airways, World Air Service, Mutual Aviation, Globe Freight Airlines, and other air-cargo operators.

The unaffiliated carrier had claimed that the certificated airlines' new tariffs, which became effective last week, permitted unfair competition by providing lower rates and cost with the help of such subsidies. CAB admitted there is little evidence available covering the costs of the certificated lines' cargo service, but it attacked as "wholly unconvincing" the argument that the regular carriers' new freight tariffs are supported by mail pay.

No Subsidy Seen—CAB did not find American and United, the chief competitors of the larger all-cargo carriers, receive no subsidy in carrying mail at 6¢ cents a ton mile. "Indirectly 95 cents a ton mile for the carriage of

mail is higher than 13 cents a ton mile for cargo. But mail is not cargo, and carriage demands safeguarding and special handling. The 45 cent rate is applicable not only to the large volume of mail carried between New York and Los Angeles but also to the few pounds packed up in Des Moines and delivered to Cheyenne or Salt Lake City."

Slack Airways' offer to carry mail at 16 cents a ton mile (Western Week, Sept. 22) as "basically an unanalyzed gesture having no relationship to costs and intended simply to confuse this proceeding," CAB declared. "No action taken by the Board given solely by the U. S. Treasury behind the offer of the certificated carriers to meet the suspension of unaffiliated lines."

Study Underway—CAB and its staff has been conferring with the certificated carriers on accounting procedures which will clearly segregate costs and permit an basis amenable to cargo operators.

The Board appeared little concerned

by the statements of several all-cargo carriers that the certificated lines' 13 cents a ton mile rates would drive the independents out of business in an unprofitable CAB industry that the certificated carriers' latest cut was aimed in retaliation for prior rate slashes by the independents. "I will increase the losses from operating to the same extent faced by the all-cargo lines would hardly be justice."

Freight Volume—Seam-Messerschmitt freight volume on the certificated airlines is soaring spectacularly. During the first six months of this year, the regular carrier flew 12,596,714 ton miles, up 22% percent over the same 1956 period. The six members of the Independent Airfreight Association—Slack, U. S. WA, the Flying Tigers, California Eastern and Panagap—accounted for \$5,269,000 ton miles in the first half of 1957.

Observers now believe that the certificated lines may fly over 23,000,000 ton miles of freight in the second half of 1957 as a result of the rate cuts.

United Air Lines showed huge cargo gains when it, together with 13 other certificated companies, dropped rates 25 percent on Aug. 1. CAB's freight volume increased from 573,000 ton miles in July to 746,000 ton miles in August and a second 3,024,000 ton miles in September. With a further rate reduction of 11 percent this month, United Air Lines expects additional sharp gains in business during the remainder of the current year.



SWISSAIR FLYING ATLANTIC

Latest European country to start Swiss-Airline service is Switzerland, whose only scheduled air carrier, Swissair, last week completed its first scheduled operation between Geneva and New York. Two additional countries are planned during the remainder of 1957, with regular scheduled flights to begin in January. Post program to serve in New York air shows inaugurating at LaGuardia Field.



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Trippe, Roig Decry Unsound Competition

In such competition from both U.S. carriers and an increasing number of foreign flag operators—made possible by ill considered CAB decisions—upping the strength of this country's oceanic services in the opinion of Pan American Airways President Juan Trippe and Pan American Cargo Airways President Harold E. Roig. Speaking before the President's Air Policy Commission prior to its trans-continental tour of aircraft plants and research facilities last week, Trippe and Roig set an urgent need for CAB to review its hand-locks on setting up the U.S. international route pattern. They declared flatly that the board had failed to prevent unnecessary duplication of service on routes not transportation.

Continuing Comptroller-Trippe and Roig American officials to the view that the country's best interest would be served by concentrating its effort behind a single American international operator on commonly owned. He disclosed these routes to be at least 10 air miles across the North Atlantic, 35 to Latin America and 5 across the Pacific competing for a volume of business which is less than one-third of the traffic handled by domestic operators.

Mention made by CAB in applying the Civil Aeronautics Act have made U.S. air transport "soft," Trippe asserted. "The industry's credit-ratio is blood-red in many ways. Government aid and investment are needed, even the increasing public deficit, are signs of the industry's fundamental weakness and have lost confidence. The hope that everything will somehow right itself if only a momentary air new routes is declared is entirely vain."

Asks Tough Review—"Nothing less than a thorough going review and re-orientation of routes and routes will do the job. The industry's credit will be restored by the government's making loans which provide capital or grants in a bid risk. Neither can the industry hope to survive as a private enterprise on the basis of operating government-owned assets made to govern more specifications and detail set by some government planning agency."

The FAA executive called for occasion of government progress of basic research and development and military research and development with government and ownership of civil aircraft left in private hands. He said adequate government programs for building domestic airport and air navigation facilities should get top priority in federal expenditures adding that an organization part of the funds being made available to foreign countries for reconstruction



TRIPPE FACES POLICY COMMISSION

Testifying before the President's Air Policy Commission this month, Pan American Airways President Juan Trippe received little support for a company's proposal to operate all U.S. revenues on routes. The FAA executive said if this plan cannot be achieved a thorough review and reorientation of existing U.S. links must be made with Pan American granted rights to operate domestically as long as domestic carriers continue to fly abroad.

should be considered for an aid.

Service Response-Trippe said that pending a re-orientation of routes and systems, expansion of service is necessary on all links maintained to U.S. carriers not yet activated. If U.S. do route carriers are to continue operating abroad, FAA, in the interest of the plan and sound economic planning, must have non-competitive domestic routes, he declared.

Both Roig and Trippe denied Russell Aronoff's charges that they had shown a lack of willingness to make available to other certificated U.S. carriers airport and navigational facilities in Latin America which had been built with CAB-approved money. Roig placed blame on the Commission. President's position in CAB citing the acquisition or substantial maintenance of Roig's Latin America route certificate (Aviation News, Oct. 6).

The FAA and Pan Am executives criticized CAB's delays in route allocation. They also asked for a study of whether the military air transport services should be created by the commercial airlines.

UAI Shifts Personnel

United Air Lines soon will establish general headquarters for its operating and passenger service departments at Denver and relocate its headquarters 2,633 Chicago employees and 78 of its 3,745 San Francisco personnel will be moved to the new location when adequate office and housing facilities are available. Executive offices of the company will remain at Chicago and ERM headquarters will continue to maintain its Western regional headquarters at San Francisco.

Flying Tigers Report Deficit in Fiscal Year

Rate was which forced cargo traffic down to capacity level in the first half of 1946 was largely responsible for the Flying Tiger Line's net loss of \$778,129 during the fiscal year ended June 30, according to the carrier's annual report. Total operating revenue was \$4,235,544.

The company lost \$1,638,180 net after of cargo disembarkation at the 12-month period, while a subsidiary, Flying Tiger Transport, Inc., operated 5,944-351 passenger miles, making contact trips within the U.S. and to Brazil, Athens, Oslo and Rome. Under a contract with the Air Transport Commission, the Tiger reported 111,451,167 passenger miles and 18,154,471 cargo ton miles during the fiscal year between Jan. 13 and July 31, 1947, without any direct United canceled again, the contract will end Dec. 1.

Domestic air freight operations were held to a minimum during the first six months of this year, but were revived recently with the acquisition of non-union carrier privileges from CAB. In contrast to the domestic cargo operation, both the ATC contract and Flying Tiger transport flights have been profitable and President Robert W. Finckel indicated the company would be in the black for the last half of 1947. Finckel's report includes two C-54s, 14 C-47s and three B-24 Superfortresses.

CAL Radar-Equipped

Continental Air Lines' entire transport fleet has been equipped with the Hughes terrain clearance indicator.

Carmichael Elected President of PCA

A long expected change in the management of Capital Airlines (PCA) took place early this month with the resignation of President C. Bebbel Moore and the election of J. H. Carmichael, formerly executive vice president, as his successor.



J. H. Carmichael

Designation of Carmichael, who joined PCA's predecessor company as a pilot in 1934, was a surprise in view of the opposition to Moore by several directors. Carmichael, in accepting the presidency of the company, made it plain to the board of directors that he had "full faith" in Moore's policies. There is considerable belief in some quarters that another change in top executive personnel is likely if PCA shows signs of relinquishing a reputation for fast and swift financial recovery.

Russell A. Dierkes—Miami, who headed PCA for 11 years, also resigned his corporate directorship of the company, but it was not accepted. Simultaneously, the existing executive committee of the board of directors submitted their resignations, and a new committee was elected consisting of Carmichael, J. C. Herbert Bryant, Alton Wells, V. J. DeWey, F. Gooding, vice president of Greater's System, Inc., Minneapolis, George R. Hara, president, Pittsburgh Business Properties, Pittsburgh, and Charles H. Marshall, PCA general counsel.

Carmichael told the directors that he would be extremely hesitant to take over the presidency without Moore's continued presence on the board. He also stated that he would not accept the post without the full support of all

the financial interests involved or without complete authority as president and chief executive officer.

Statements to Employees—In his resignation statement to PCA employees, Moore pointed out the "great depression of opinion" among outside financial interests as to whether to continue their support of the existing management. He expressed complete confidence in his successor, noting that the reconstruction of the executive committee and the election of Marshall as a director and member of the committee



C. Bebbel Moore

were in accordance with Carmichael's recommendations.

Other proposed developments:

► **American-F 2 Reliance**—Formerly DC model also may be less expensive because of the use of a new engine. Gerry W. Hovest, Jr. has been named General representative of this effort.

► **Boeing-Boeing F. 400**, 26, has been applied for in the Division of public works.

► **FAA**—Two structural program changes (S-1 and S-2) have been submitted to the FAA. FAA committee has not yet begun the review of S-1 and S-2.

► **Lawson-Sutton C. 400**—Sutton, with 18, has been selected for the FAA. The FAA committee has not yet begun the review of S-1 and S-2.

► **Boeing-Boeing F. 400**, 26, has been applied for in the Division of public works.

► **FAA**—The FAA committee has not yet begun the review of S-1 and S-2.

Nonscheds Receive New CAB Warning

Seventy-five unscheduled airlines operating as regular carriers under the nonscheduled exemption (section 292.1 of the Economic Regulations) will have their letters of registration suspended this week unless they file appropriate audits with CAB and otherwise comply with requirements of the Civil Aeronautics Act.

The Board's action followed closely its decision to participate in New York court proceedings and to suspend all other third parties on the New York-San Juan route (Aviation Week, Oct. 6) and left little doubt that the emphasis on nonscheduled lines for lease operating practices is at hand. CAB and the unscheduled carriers' failure to file and observe traffic has created unusual economic conditions and contributed to unfair and destructive practices in air transportation. Some of the lines also have failed to furnish the board with periodic operational reports required under section 292.1.

► **Pica Dinkel-Memphis**, CAB has refused to extend for another six months the suspension which prevented regular service to five passengers in foreign ports. Trans Caribbean Air Cargo Lines and Transocean Air Lines had protested provisions of section 292.1 which barred nonscheduled foreign transportation of persons after Sept. 15.

The nonscheduled passenger-carrying lines accused a verbal attack from CAB this month when the Board, as a major staff order, refused to file at "check" services providing little public benefit but "vestibular" service.

The courts also were cracking down, with Trans Pacific Airlines, an unaffiliated company in Hawaii, suspending service operations as a result of an injunction obtained by Hawaiian Airlines, the company's only certified service. A similar injunction against "illegal scheduled flights" previously was obtained against an unscheduled Alaska operator (Aviation Week, Sept. 15).

CNAC Granted Rights For Trans-Pacific Run

China National Aviation Corp. has been granted a foreign air service post authorizing air service between Shanghai and San Francisco via Honolulu. CAB approved the operation in accordance with the latest air transport agreement between the U. S. and China.

The Chinese government sent 63 percent of the carrier's outstanding stock, and the remainder is held by Pan American Airways. CNAC has more than 197 million passenger miles last year over General routes.

Log of a Viking

Bombay to Cairo
2670 miles, in 14 hrs. 55 mins. (one day)

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Air France Inaugurates Sleeper Flights to Paris

Another lease) or service, for the well-known Trans-Alantic transfer was to become available this week with France inaugurating all sleeper, overnight Constellation flights between New York and Paris.

The eyes here, began will be flown on a once weekly basis and will supplement the carrier's regular Trans-Alantic Constellation service, which is operated four times weekly. Only 35 passengers will be accommodated in the sleeper plane. To the regular one-way fare of \$245, \$125 for a single berth and \$150 for a double will be added.

Leaving New York at 7 PM on Tuesdays, the Golden Comet will arrive in Paris between the next day, "only 7½ hours at all available to late man."

Two-thirds of the sleeper will be carried on the day-plus plan. Pan American Airlines had announced the first sleeping sleeper service between New York and London with new type Constellations carrying 15 passengers—15 in berths and 10 in reclining chairs. PAAs also sold \$25 above the regular \$225 New York-Los Angeles one way for sleeper accommodations but lets two passengers sleep in its lower berths at no extra charge.

Milanola, believe (Belgian Airlines) was prepared to start DC-6 sleeper service Oct. 11 between New York and Brussels, with an extra charge of \$113 for an upper and \$130 for a lower berth one way.

CAB SCHEDULE

Per. 48. Specific on additional carrier in other country (Chicago 1938 of 1) per. 44. Which are listed Airlines registration in United States, the member countries (Chicago 1938 of 1) per. 41. Which are listed Airlines registration in United States, the member countries in Latin America, (Chicago 1938 of 1)

per. 41. Which are listed Airlines registration in United States, the member countries in Latin America, (Chicago 1938 of 1) per. 41. Which are listed Airlines registration in United States, the member countries in Latin America, (Chicago 1938 of 1) per. 41. Which are listed Airlines registration in United States, the member countries in Latin America, (Chicago 1938 of 1)

per. 41. Which are listed Airlines registration in United States, the member countries in Latin America, (Chicago 1938 of 1) per. 41. Which are listed Airlines registration in United States, the member countries in Latin America, (Chicago 1938 of 1)

Joint Terminal Setup Criticized by Patterson

The surface joint terminal operation at Willow Run Airport, Detroit,

is a complete stop," said another look at overall legality may be expected in all such categories, in the opinion of United Air Lines President W. A. Patterson.

The airport hasn't saved money and it cutting so much or more than when the individual carrier took care of their own ramp needs, Patterson said. He added that aviation is "subsidized."

Underlying some of the critics, the IAL executive declared are the warring out of competition and the fact that airports have no opportunity for advancement or working for the terminal company. Chicago and Southern Air Lines and American Airlines are the only ones who have made plans to well-known in the past operation but later decided to give the service more time to prove itself.

Mail Volume Increases Under Five-Cent Rate

First year of five-cent domestic annual has brought an average gain of 33 percent over the letter volume of September, 1946, the last month under the wartime eight-cent rate, according to Postmaster General Robert E. Haugen. Average volume in the past year has been about 5,500,000 lb a month, compared with 4,384,195 lb in September, 1946.

Sharp increases in volume rates last Nov. 1 resulted in a 75 percent increase in revenue monthly volume in the first half of 1947. Volume mail load was 3,023,438 lb in October, 1946, the last month under rates ranging from 15 to 20 cents a half ounce, while during the first half of this year—with a maximum rate of 25 cents a half ounce—volume monthly loads rose 354,527 lb.



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SHORTLINES

▶ American—On Nov. 15 will offer sleeper service on east and west bound run of its daily coast-to-coast Mercury Flight. The DC-6 will be conventional planes with seats available to passenger out during hours.

▶ American Overseas—Three seats to London, \$200,000 have been sold in England, N. Y. Federal Court against the U. S. Government in behalf of widow of crew member killed in the crash of an AJMA DC 4 at Stephenville, Newfoundland, Oct. 3, 1946. The Government is charged with negligence in failing to provide lifebuoys, markers or signals as adequate against the danger of the terrain. The plane struck a hill in darkness shortly after takeoff.

▶ Chicago & Southern—Reports call profit of \$1,518 in August. Company also made profit but loss of 50,000 rounded the profit last bill to a loss of 25,500 during August.

▶ Eastern—Has applied to CAB for authorization to extend its route 28 metropolitan areas from the present Atlantic seaboard point, Evansville, Ind., to the terminal point Minneapolis/St. Paul, to St. Louis, Mo., Detroit, Springfield, Birmingham and Young, Ill.; Baltimore, Trenton, New York, Cedar Rapids, Chicago, Dubuque and Waterloo, Ia.; and Rochester, Minn. EAL also asked an extension from Chicago to Minneapolis, St. Paul and Rochester, Minn.

▶ Mail-Carriers—Reports net profit of \$45,977 in August compared with \$77, 504 in the same month last year. All patterns downward in previous months' depreciation and other expense, compared with August savings; pay the carrier a 5% net profit last but the first eight months of 1947. August operating revenues were up 5 percent over July and 25 percent above August last year, while revenue passenger miles gained 17 percent over August, 1946.

▶ Northwest—Plans to hold a special meeting of stockholders Oct. 20 to set up authorization to issue \$5,000,000 shares of non-voting stock. Proceeds of the new issue may be used in part for payment of NEA stock totaling about \$560,000 held by Atlas Corp.

▶ Pan American—Was slated to increase its round-the-world service to two flights weekly only this month.

▶ TVA—Reports passenger load factor in the first three weeks of September increased about 77 percent, well above the extended 64 percent benchmark point. Carrier reports complaints dropped from 3.5 per 1,000 passengers in the first six months of 1946 to 2.6 in the same 1947 period.

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IATA General Session Starts in Petropolis

(McGraw-Hill World News)

PETROPOLIS, Brazil—An transport exposition from all over the world have gathered at this resort city for the International Air Transport Association meetings expected to run through most of October.

About 100 representatives of the 65 member companies and of IATA's own administration, went to attend the assemblies at the Grand Hotel D'Outardeiras, which in August and early September hosted the conference of American foreign airlines. Many of the aviation executives booked rooms at Rio, where the executive committee and local committees met at the Hotel Cassino das Palas on Rio's most beautiful beach, some 40 miles from here.

Representatives from IATA's three zones, consolidated from the previous regions, will confer separately and then collectively during the sessions. The global divisions under the new setup:

I—Western Hemisphere and adjacent islands including the Howland, Midway and Palapas.

II—Europe (including adjacent islands and Reunion Island), Middle East including Iran, and Africa.

III—Asia, Australia, and Pacific Islands not in Group I.

Cost analysis reveals here the tolls like last month, their past global airline rates related necessarily to a case of efficient operation. Traffic confirmations of the three zones also have increased with the rate and schedule, conditions of traffic and patterns relative to travel agencies. Last statistics of the three traffic groups have listed.

IATA's third annual general meeting is for Oct. 14-15 at the D'Outardeiras Dr. I. Renato Ribeiro Duarte, president of the Brazilian airline Cruzeiro do Sul, is to ensure the consistency, replacing Dr. Julio AEA Faria of the French line, AIRER.

Reports by Sir William P. HEDDER, director general of IATA, and by financial, legal, technical and traffic committees are scheduled. There will be discussions of the Warsaw convention, which deals with the airline's liability toward passengers and shippers.

The meeting probably will accept some new members, particularly Italian without doubtless and the recent signing of the Italian entry to it. It is probably will arrange proposals to spread the articles of association to take in charter lines and other non-scheduled carriers as associate members.

All sessions are private except opening and closing sessions of the general meeting.

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Production Freedom for Military Contractors

Aircraft engine and propeller engineers will gather this week at Wright Field with representatives of Army and Navy in a meeting which will not get attention it deserves because of the complicated nature of the subject—standards of parts and materials.

The meeting, however, is of utmost importance to engine manufacturers, primarily, and to all aviation, sea and air. It brings to the fore again the old matter of the extent to which government should exercise control over the work of a company doing business with it.

The situation, briefly, is this: In an entirely understandable and to obtain the best possible item, the purchasing agencies of the government lay down rigid requirements to which all items must conform. In addition to prescribing performance and reliable standards that must be met, in the finished article, the government goes into the details of the engine or propeller, for example, and insists that the smallest part must conform to stated standards of size, strength, etc., that presumably have been tested and found satisfactory.

Through the years, these requirements have multiplied and multiplied again. The engine technical committee of the Aircraft Industries Association now says that with each military engine contract goes 5,100 pages of specification material. In 1937, ten years ago, there were 1,200 pages. Twenty years ago, in 1917, less than 100 pages were required.

Military specifications stem from any one or all of seven sets of standards: Federal, joint Army and Navy, Army, Navy, Army and Navy Aeronautical, Air Force and Bureau of Aeronautics. In theory, any of these standards as prescribed is optional, only provided that the applicable government standard is not readily available. In practice, according to AIA, engine manufacturers are being required to justify "with supporting evidence of its suitability," the application of an industry specification whenever a similar military specification exists.

The industry's position in respect to these military standards is that they are largely unnecessary, confusing, and costly. Assume an engine manufacturer is given a contract to develop, then build, a certain engine. It is supposed to meet certain performance guarantees. Obviously, if it does not, it is accepted after service testing, the material and parts in the engine are suitable and satisfactory. Under the present system, the manufacturer is required to design and build that engine to meet certain performance requirements. But he has no control over the material and parts he uses which will give him the end result. He must use those parts and materials which are specified and which have been proven in the past in

connection, perhaps, with entirely different engines.

Often, the manufacturer knows from his own experience that the use of a part made to his own company standard, or a standard generally in use throughout the industry, is as safe and reliable as a part made to a military standard—and it is likely to be less costly because it is more generally available and is produced in greater quantity than the smaller military standard part.

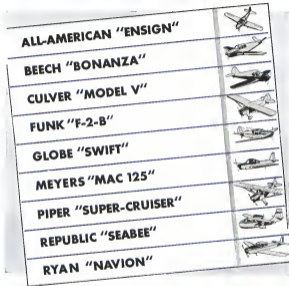
In essence, the manufacturer's contention is that if they are to be charged with the responsibility for the performance of the engine, they must have control over what goes into it. The Aeronautical Board, the joint Army-Navy agency which sets procurement policies, has served notice on manufacturers that, while they must use military standard parts, "satisfactory operation of equipment, procured under any standard, is the responsibility of the contractor."

There is a further extension of this responsibility aspect. The manufacturer's stake in his product is not limited with its acceptance by the Army or Navy. As long as that product is used, its reputation is involved. Under the present system of government-prescribed standard parts, the manufacturer's product may be accepted in the field with parts produced by a variety of suppliers, so long as they meet a particular military standard. For any of several reasons, these suppliers may be given permission to produce parts varying slightly from the standards. These variations may or may not affect the performance of the engine or propeller.

The industry sums up its case in these words: "The engine industry freely recognizes the services' responsibility and duty to set forth its requirements pertaining to performance, durability and the coordination of related equipment, but industry believes that it is incorrect in principle for the services to prescribe the materials, the design and arrangement of the parts, and the manufacturing processes which must be employed in meeting those requirements. Before it is acceptable to the services, the small engine must be designed and developed to pass rigid performance, qualification and acceptance tests. After it is delivered, industry is held responsible for the satisfactory operation of the engine in service. In accepting those responsibilities, industry must have the freedom of preparing its own specifications for materials and the freedom of designing and manufacturing the parts in its best judgment dictates. Secondly, it has the particular timing and experience. This is the only way it can be accomplished effectively and economically."

It appears to be a strong case.

*They All Choose Du Pont "LUCITE"
... for Vision, Service, Safety*

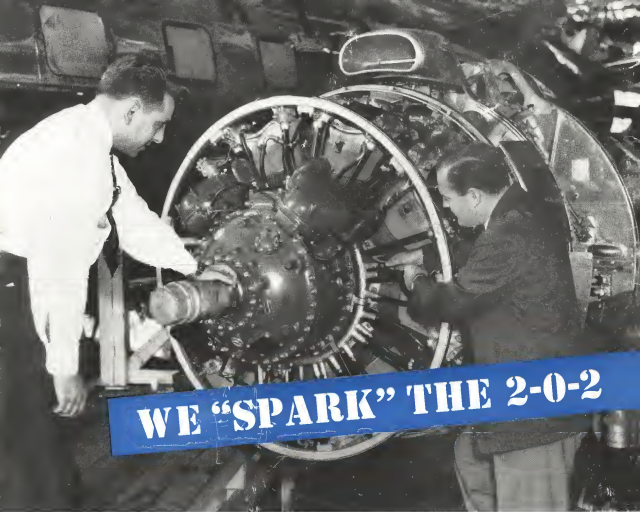


IN RAPIDLY increasing numbers, plane manufacturers are selecting Du Pont "Lucite" for their transparent enclosures.

"Lucite" acrylic resin is crystal clear, long-lasting, and shatter-resistant. "Lucite" transmits over 90% of light rays, and one-piece construction of "Lucite" will eliminate blind spots.

During the war, every make type of combat aircraft used "Lucite" in one or more applications. Today, its proven advantages help make better planes. Yet "Lucite" costs even less, in medium and greater thicknesses, than other plastic materials used. E. I. du Pont de Nemours & Co. (Inc.), Room 720 Plastic Department, Arlington, New Jersey.





WE "SPARK" THE 2-0-2

At the Baltimore plant of The Glenn L. Martin Company, a General Electric Service Engineer and a Martin representative inspect the new G-E high-tension ignition system on a 2-0-2. This system, revised from the warplane version, will be used on many of the new airline planes. Northwest Airlines has requested it for the 2-0-2s they propose to fly. It will also be used on many of the Martin 3-0-3s, the twin-engine cabin-pressurized airliner soon to enter service.

This ignition system, used on Pratt & Whitney engines in such planes as the C-46 and the P-47 during the war, has been modified for the new R-2800CA engine powering the 2-0-2. Its long service record, plus the fact that it requires little or no maintenance between engine overhaul periods, made it a logical choice for commercial planes.

Our Aviation Divisions are prepared to supply many types of engineered systems and precision products for aircraft. Lightweight, carefully designed and manufactured to meet specialized aircraft requirements, our power systems, motors, control, turbosuperchargers, and jet engines, as well as all types of instruments, may well fit into your plans. Simply contact the nearest G-E office. Our Specialists will be glad to work with you. *Aviation Divisions, General Electric Company, Schenectady 5, N. Y.*



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